

FLIGHT

The
AIRCRAFT ENGINEER
AND AIRSHIPS

No. 1361
Vol. XXVII

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

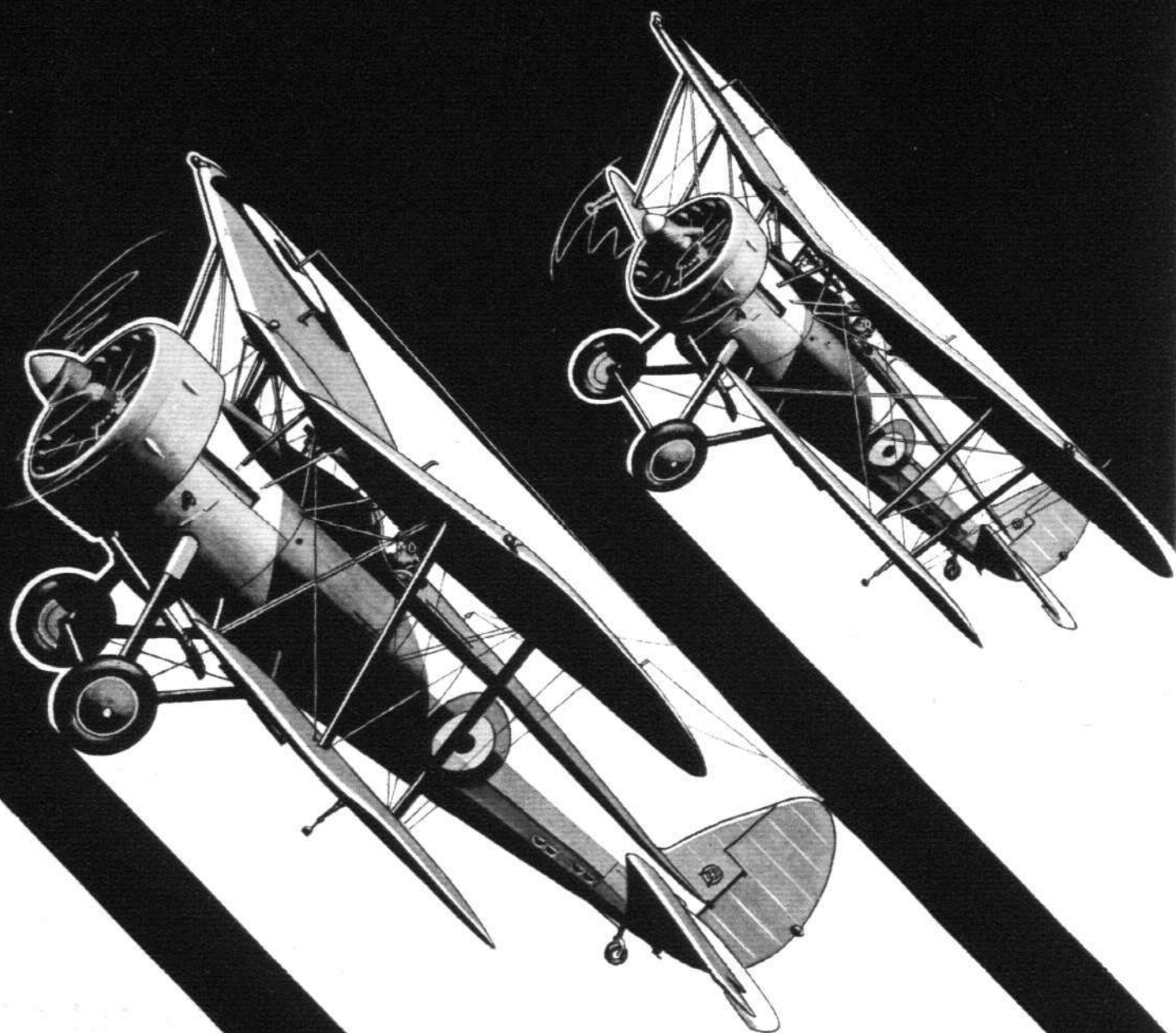
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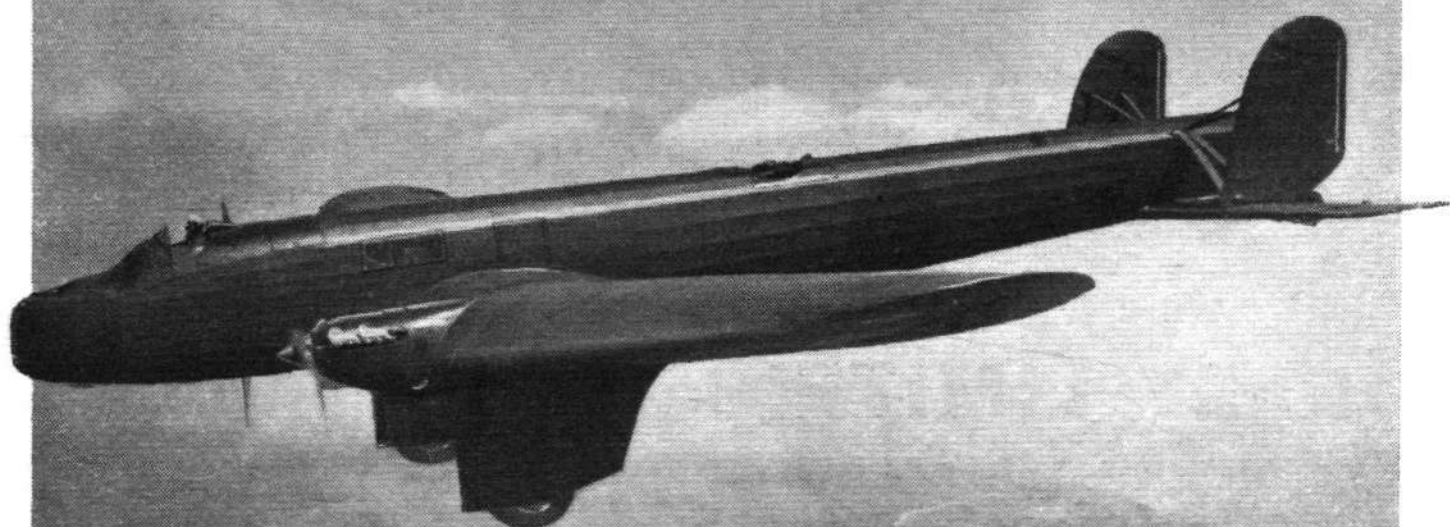
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Founded in 1909

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The Grid Danger

FOGS are persisting later than usual this winter, and they bring danger to aircraft as well as to shipping. Perhaps, before long, our hymn-books will include a petition "for those in peril in the air." On the organised air routes science is ever devising means to overcome the danger, but the private flier, who usually does not carry wireless equipment, cannot benefit from all these devices. It is a horrible sensation to be unable to see the ground and to know that at any moment one's machine may hit a pylon or a cable of the power grid.

Competent electrical engineers are definite that it is quite impracticable to carry the cables underground. The difficulties of insulating lines of such high voltage put this out of the question. Recourse must be had to means of warning pilots of the danger, and this may be done either by means of wireless or by visual means. There is a distinct probability that aircraft which carry wireless can be warned of the position of a pylon or of any other danger such as a factory chimney by a constant transmitter on the obstruction, emitting a certain note. This note, of course, would only be audible to the wireless receiver and not to ordinary human ears; there is no danger that a countryside whose beauties are not exactly increased by the lines of pylons stretching over hill and dale will be further desecrated by constant audible noises from all the more lofty pylons. To aircraft equipped with receivers these warning noises should bring adequate safety.

Visual warnings are a still more complicated matter. Some time ago experiments were carried out near Hornchurch aerodrome, and lanterns containing three sixty-watt red lamps were placed on the apex of each of four pylons. The cost worked out at about £130 per pylon, and the annual maintenance at £5 per pylon. Obviously, this method is too expensive for universal adoption. Even if it were not so, it is a risky business for the maintenance staff to work on the lamps while the

current is on, and switching off the main supply of an area while adjustments are made to the lamps is also an expedient not to be contemplated. Recent research seems to have found a solution in a new form of neon lamp which derives its power from the grid itself, and which can be put in position without risk to the men engaged. As soon as this has been perfected, it is to be hoped that there will be no delay in hanging these lamps at all spots where pylons are likely to cause danger to aircraft.

Flying-boat Supremacy

SOME years ago *Flight*, by its persistent advocacy of marine aircraft, earned for itself the nickname, "The Seaplane Journal." In season and out we pleaded for research and development of a type of aircraft which was, at the time, being treated in a very stepmotherly way by those in charge of Great Britain's air policy. We were met with scepticism on all sides, except by one or two of the British firms which were virtually specialising in marine aircraft and were fighting a losing battle. But we were so convinced of the soundness of our views that we did not lose heart, and in time we were rewarded by a change in outlook. Seaplane research was started in real earnest, orders were placed for twin-float seaplanes and flying boats, and development got into its stride. In a very few years Great Britain had achieved a position of unquestioned leadership, and the future looked bright.

If we look around to-day the position is far less reassuring. The slump period hit this country very hard, and "in the interests of economy" an order which had been placed for a very large civil flying boat was cancelled. On the service side progress was very slow. Those in control did not quite seem able to make up their minds as to what type of flying boat they did want, a high-speed type, a long-range type, or a compromise. While all this was going on in Britain foreign nations had realised the tremendous possibilities of the flying boat. Backed by Governments possessing the foresight

to see what was wanted, foreign constructors set to work. The results of their efforts are now just beginning to be seen.

In this issue of *Flight*, data are given of two American and one new French flying boat. The figures give one somewhat "furiously to think." If published figures are to be believed, the new Martin "Clipper" has a maximum range of 4,000 miles, and a range of 3,000 miles when carrying passengers and mails.

Another American boat, the Sikorsky S.43, is a much smaller machine, able to carry sixteen to twenty-five passengers, according to the range desired. This represents the "last word" in efficiency. It is an amphibian twin-engined monoplane, in which the wheels, when raised, lie flush in the sides of the hull, while the out-board floats disappear into the wing. With a total power of 1,500 h.p. the maximum speed is estimated at 200 m.p.h. and the cruising speed at 180 m.p.h.

French Enterprise

In France the Latécoère company has just launched the *Lieutenant de Vaisseau Paris*, a four-engined monoplane boat intended for the South American service. The French machine impresses by its very size rather than by spectacular performance. At a gross weight of nearly 70,000 lb., this machine cruises at 125 m.p.h., and has a range of 2,800 miles, which is sufficient for the South Atlantic route.

We are aware that orders have been placed with British firms for up-to-date civil flying boats, and we do not for one moment doubt the ability of British designers to produce first-class boats. But a very considerable delay must take place before such craft can be put on the services, and in the meantime our foreign

competitors are threatening to take the lead, a situation which would not have arisen had this country followed persistently a strong flying boat policy.

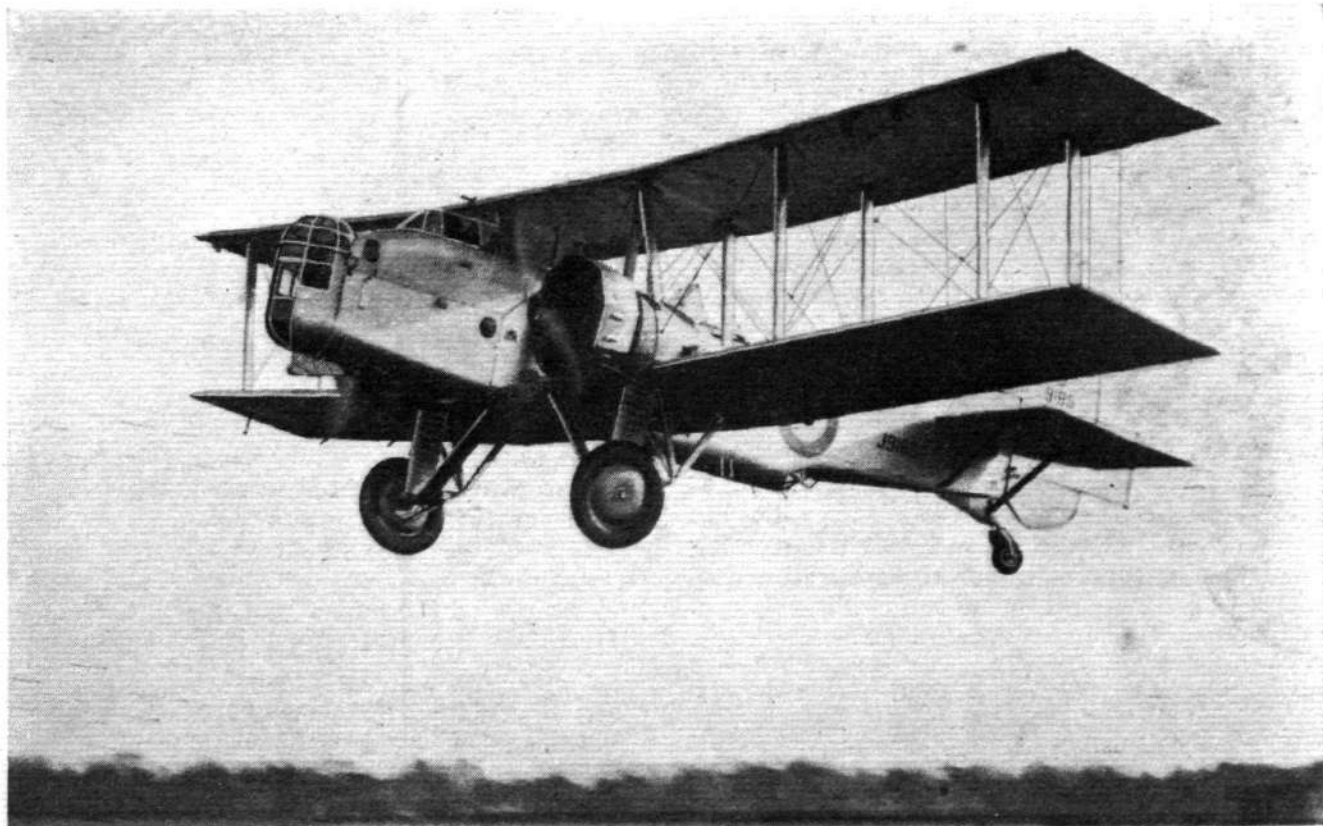
The R.A.F. Reserve

NUMEROUS letters have been received in the last few weeks by *Flight* from young men who wish to join the R.A.F. Reserve as pilots and seek guidance as to how to set about it. Full information is given in the Air Ministry notice on page 102 of this issue. No fewer than two hundred pilots are needed at once, and there is no doubt that plenty of applicants will come forward. The prospect of being taught to fly and being paid for learning is sure to appeal to the young men of Great Britain, for it is indeed a most attractive offer.

Trained pilots are also invited to join the Reserve, and to them the invitation should appeal as a patriotic duty. They will be paid for most of the time which they give to the service of their country, but the great incentive should be that they will add to the safety of Great Britain. It may be mentioned that if the Reserve were to be called out in an emergency the members would be posted to regular squadrons. They have nothing to do with the Special Reserve men in the Cadre squadrons or with the Auxiliary Air Force.

To learn to fly is almost a duty for the young men of to-day. For those who cannot join the R.A.F. Reserve there is the Young Pilots' Scheme of the Air League. The two may well work together in spreading the gospel of the air, but the country's call comes first, and all our younger readers should study the terms of the Air Ministry notice.

GOING INTO SERVICE



The Boulton Paul "Overstrand" with two Bristol "Pegasus" engines: A substantial development order for these machines has been placed by the Air Ministry. It has not yet been decided which squadron or squadrons will receive this very formidable medium bomber. (*Flight* photograph.)

The Outlook

A Running Commentary on Air Topics

An Aero Show This Year?

THE leading article in last week's issue of *Flight* on the possibility of holding a British aero show this year has caused a great deal of interest. On pages 91 and 92 will be found extracts and summaries of letters which we have received, and the reader will see that there is by no means unanimity among our correspondents on the subject of a possible venue for such a show.

It is fairly generally conceded that the general public is likely to visit a show at Olympia in far greater numbers than could be attracted to an exhibition at an aerodrome. Thus, a very much more substantial "gate" might be expected, and this would help to offset the extra expense. The organisation of an Olympia Show would, however, be an undertaking of considerable magnitude, and it is, perhaps, questionable whether there is time to make the necessary arrangements for this year.

An Alternative

AN extension of the period of the S.B.A.C. Display at Hendon, at which the number of "static" exhibits was increased, seems to be regarded as the most likely compromise between what one would like to do and what it is possible to do. It is not an ideal arrangement. Hendon is an R.A.F. station, and the authorities may not relish the idea of it being retained for civil purposes for another day or two. But, as we said last week, this difficulty could probably be surmounted satisfactorily.

There is, also, the possibility of arranging something in connection with the Air League's Empire Air Day. Shows arranged on this basis would, presumably, have to be split up, some firms exhibiting at one aerodrome and some at another. The number of visitors at any one place would not be as great as if a central exhibition were held, but, on the other hand, districts might be visited which it would otherwise be difficult to interest.

We do not agree with the suggestion of holding the show next year. There will then be the Johannesburg Exhibition and, presumably, the Paris Aero Show. Also, a good opportunity to do something out of the ordinary occurs this year in connection with His Majesty's Jubilee. Such an opportunity should not be missed.

The "Rota" Crash

THE prominence given in the daily papers to the sad news of the first fatal accident to an Autogiro in this country indicates the confidence which the public has come to feel in the safety of this type of aircraft. The "Rota," as the C.30 is called in the Royal Air Force, had won the highest praise of the instructors at the School of Army Co-operation at Old Sarum, and they were already teaching selected officers from the five army co-operation squadrons in this country to fly it. Next summer each of these squadrons is to be given one "Rota," and experiments will be made in using it for ordinary reconnaissance and in spotting for the artillery. The pilot of the crashed machine, F/O. Oliver, from No. 2 (A.C.) Squadron at Manston, was one of the pupils.

It is not the custom of the Air Ministry to publish the finding of the Inspector of Accidents in the case of R.A.F. crashes, but exceptions are made in special cases. If we remember rightly, the case of Flt. Lt. Kinkead in a Super-

marine S.5 was one exception. This "Rota" crash is also a special case, because public confidence in the Autogiro type is involved. The public will very insistently want to know the cause of the accident, whether it was due to an error of judgment by the pilot (for it was thought difficult for even a novice to make a fatal mistake when flying an Autogiro) or to any fault in the machine. We very strongly urge the Air Ministry to publish the findings of the Inspector of Accidents, and to publish them with the minimum of delay.

Insurance Developments

INSURANCE business is always an indication of the state of any particular industry. In aviation, our needs so far have mainly been catered for by the British Aviation Insurance Company, Mr. Graham Mackinnon of Lloyd's, and Mr. E. R. Hill, also of Lloyd's. Elsewhere in this issue there is an announcement of the formation of yet another company which is, in effect, a combine of many existing concerns. That the state of the industry is such as to interest the insurance world to this extent is a subject for rejoicing; we may, perhaps, now look upon ourselves as one of the main industries of the country.

The scheme will also tend yet further to strengthen England's position in the world's aviation insurance market. Already a large proportion of the world's business is done in London and much of that placed elsewhere is re-insured in London. The formation of the company suggests that the organisations concerned (who form the bulk of the tariff companies not already interested in the B.A.I.C.) have realised that they can no longer fail to ignore what will assuredly become as important to the insurance market, and to Lloyd's in particular, as is surface shipping.

Pre-War News Enterprise

A NEWSPAPER last week, describing the rushing of a cinema newsreel from Germany to London by a specially chartered aeroplane, remarked that such methods of serving up news piping hot on celluloid were unknown before the War. That the statement was inaccurate was fairly obvious, but it so happened that we were re-reading that very excellent and well-illustrated book, "The History of British Aviation, 1908-1914," by R. Dallas Brett, and therein came across a description of an effort which was really remarkable at that stage of aviation history.

On April 21, 1914, His Majesty the King paid a ceremonial visit to Paris. B. C. Hucks, flying a Bleriot with a film cameraman on board, circled the royal yacht and its escort at 400 feet in mid-channel, then carried on to Calais and enabled the operator to obtain further shots as the yacht entered the harbour.

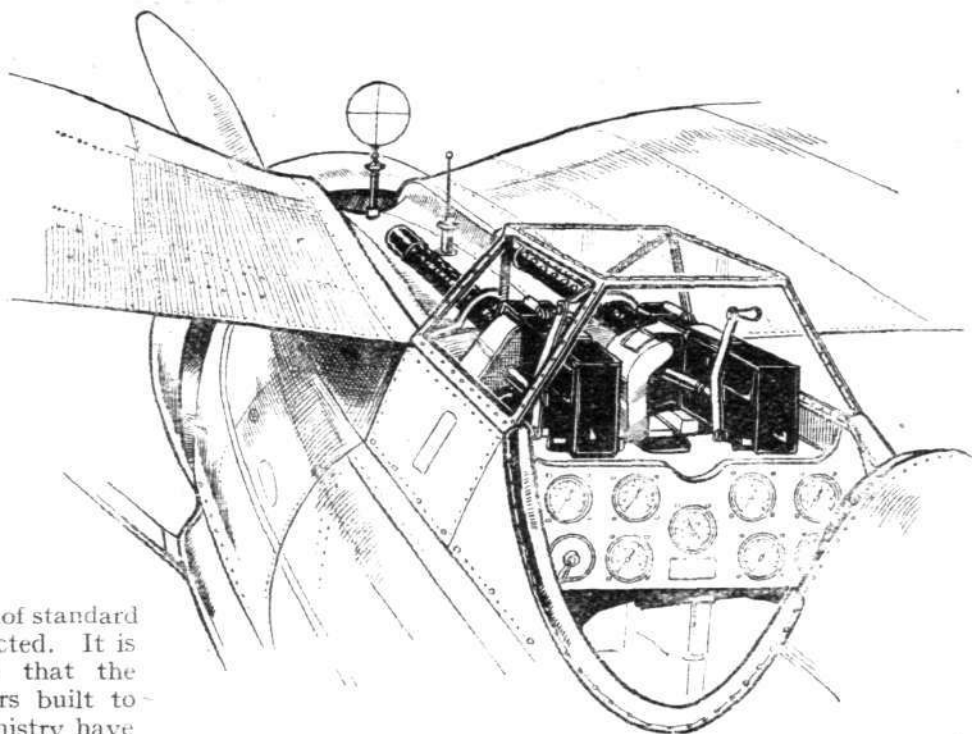
Hucks then landed the photographer, and left for London with the exposed film at 1.45 p.m. He reached Hendon at 2.35 p.m., having covered 125 miles in very bumpy weather in 110 min. The complete record of the King's journey was shown on the screen at the London Coliseum at 5.20 p.m. that evening.

Flight at the time described the venture as "enormously important in indicating the future effect of aviation on news."

AIRCRAFT ARMAMENT ABROAD

Modern Practice Reviewed : The Continental Vogue of the "Canon" : Heavily Armed Fighters : High-powered Engines : Sheltered Gunners

By H. F. KING



Excellent fighting view and heavy armament are features of the Polish P.Z.L. P.24. Note, in this view, the "valley" for the machine guns.

A GENERAL increase in the armament of standard fighting aircraft may soon be expected. It is common knowledge by this time that the single-seater day and night fighters built to specification F.7/30 of the British Air Ministry have four machine guns, or twice as many as are mounted by the machines they are intended to replace. Similar, if not greater, increases in the fire power of single-seaters are indicated on the Continent. There, designers are going a step farther. They are not merely duplicating machine-gun armament, but are fitting small-bore *canons*, the development of which has been so carefully fostered in France.

These amplifications of the attacking power of single-seaters have resulted from the realisation that this type of machine has very definite limitations. If an aircraft can fire only in one direction, designers are saying, then fire power must be as heavy as possible compatible with the retention of the fighter's essential qualities of speed and manœuvrability. So they mount additional and larger guns, and find that their aeroplanes, if they are to compete with more lightly armed machines, must be correspondingly higher-powered. Consequently, this increase in armament is one of the reasons that we find Continental single-seaters with Hispano "Y" type engines or Gnome-Rhone K.14's of 800 or 900 h.p.

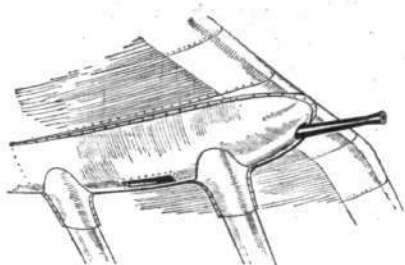
Certain schools of military thought maintain that with

this large rise in weight one might sacrifice some of the forward fixed armament and, in its place, have a rear gunner with all his attendant advantages while maintaining a performance substantially similar to that of the single-seater. The Mureaux 180 C.2 monoplane exhibited at the Paris Show is an example of a two-seater fighter derived from a single-seater—in this case the 170 C.1. Both types employ an Hispano-Suiza "X" engine of 650 h.p.—that in the two-seater is an *Xcra moteur canon* (i.e., it has a gun lying between the cylinder banks and firing through the centre of a geared airscrew shaft)—and the performance of the two-seater is little inferior to that of its predecessor.

Perhaps the most formidable-looking single-seater fighter exhibited at the Paris Show, and probably the most powerful in existence in Europe at the time, was the Polish P.Z.L. "Super P.24" with a 900 h.p. Gnome-Rhone K.14 engine, two 20 mm. Oerlikon *canons*, and two machine guns. The *canons* are mounted in large fairings at the

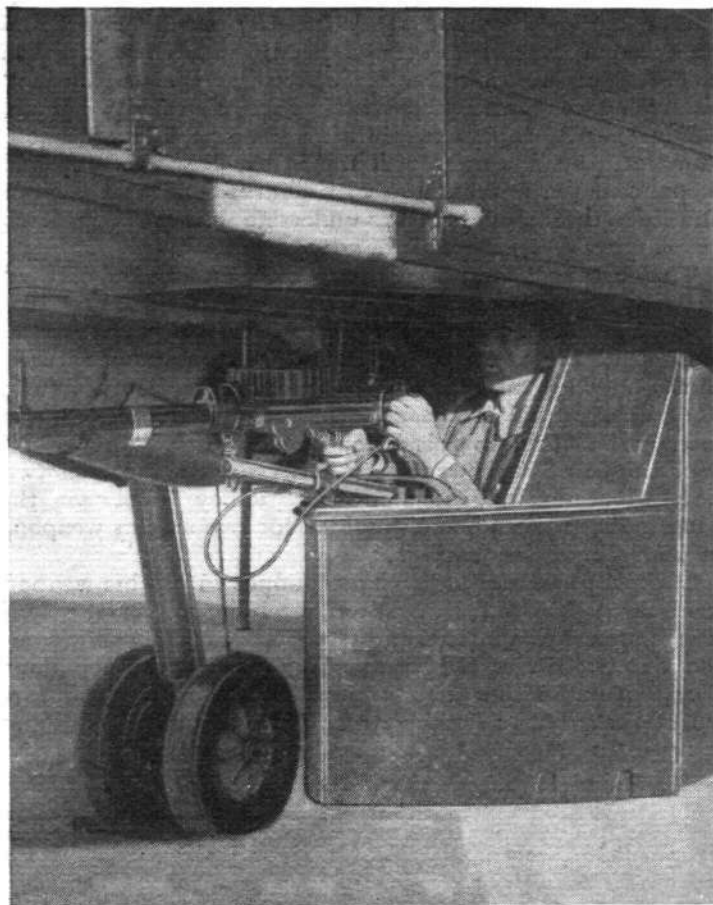


Two French *bicanon* single-seaters : The Loire 46C.1 and the Dewoitine D.372, with small-bore quick-firers mounted in their wings.



(Left) The mounting of one of the canons in the P.Z.L. P.24.

(Right) A gun position at the rear of the hanging "car" of the French LeO.208 bomber.



point of attachment of the lift struts and wings, and eject their empty cartridge cases through slots in the bottoms of the fairings. This placing of *canons* in wings obviously has much to recommend it, for a *moteur canon* of the Hispano-Suiza type can accommodate only one gun.

The Oerlikon *canon*, the type which was responsible for the revival of the *canon* craze on the Continent (one must not forget that Hispano *moteur canons* were employed during the war), is of 20 mm. calibre, and its shells have a muzzle velocity of 2,723 ft./sec. Fitted with a full magazine holding sixty rounds, the gun weighs 161 lb.

Little information is available regarding the French *bicanon* or *pluricanon* machines at present being developed, but it is known that certain of the prototype aircraft, including Loire and Dewoitine monoplanes built for the last competition for single-seater fighters held by the French Government, have been modified to take two *canons* in their wings. The Morane 227 C.1 fighter monoplane is fitted with an Hispano Xcrs *moteur canon* and a pair of Chatelleraut machine guns mounted outboard. This seems to be quite a promising effort at solving the problem of armament distribution, and deserves close watching.

An Aerial Field-gun

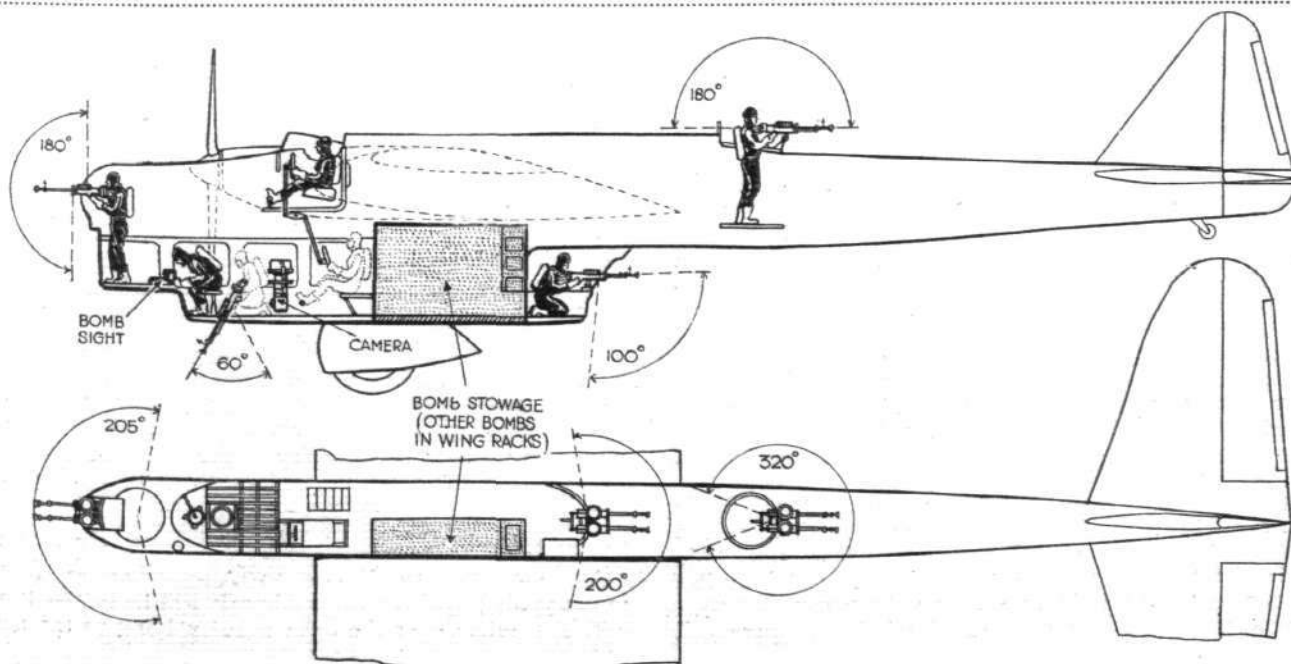
It is intended that the practical employment of these *multicanon* machines should be similar to that of normal single-seater fighters, the view generally taken being that a *canon* is only a machine gun of large bore. Some of the new *multiplace de combat* machines may be armed with 20 mm. or 25 mm. *canons* if desired, and there is a story in circulation that a very large French bomber, believed to be the Bordelaise A.B.21, has been equipped with a "75." In this country we have a squadron of flying boats mounting 35 mm. Vickers-Armstrong quick-firing guns, the flying boat being one aircraft obviously suited for such equipment.

Little is heard of increases in armament of fighters in America. For some years past, of course, the 0.50 Brown-

ing has been a standard weapon, and has been mounted in company with the 0.30 gun. A very great deal of development work on electrically controlled outboard guns has been done over there, but for fighters the synchronised type is still holding its own. For the heavily armed "attack" machines, however, like the Curtiss "Shrike," which has its four front guns mounted in the "trousers" of its undercarriage, the outboard weapon is popular.

Vickers 0.50 guns have also been mounted on certain Italian types, as, for example, the Fiat C.R.30. The Breda 27, shown at Paris, mounts a pair of synchronised 7.7 mm. Breda Safat guns for which 800 rounds of ammunition are provided. This machine, incidentally, was one of the exhibits fitted with a mirror enabling its pilot to see what is "on his tail."

An excellent example of a Continental "multi-gun"



This diagram shows the disposition of armament in the Amiot 143M. Members of the crew occupying alternative positions are indicated by dotted lines.

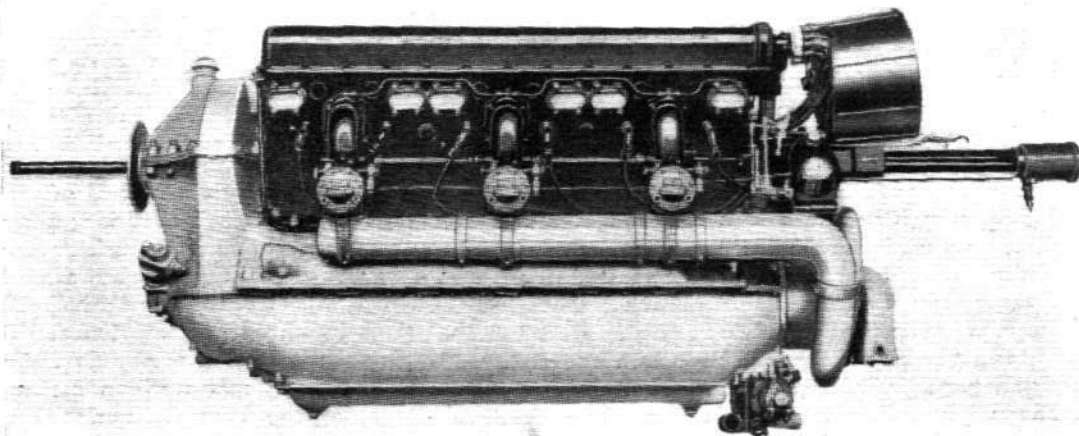
fighter is the Letov S-231. When this machine was first produced it carried its four guns in the top plane placed outboard of the airscrew arc, where they needed no synchronising gear, and where their rate of fire was not dependent upon engine revolutions. In the latest version, however, the guns are still outboard, but are arranged in pairs in the lower plane with chutes ejecting the cases and links through slits in the underside of the wing. Each gun is provided with 250 rounds.

The arrangement used has, one understands, been patented by the Letov engineer Smolik. It appears that the converging point of the lines of fire of the inner and outer pairs of guns, or "batteries," as the company calls them, may be varied during flight in their distance from the machine from 120 yards to infinite. Two *canons* are soon to be fitted to this machine. Another "four-gun" type shown at Paris was the P.Z.L. 11C, which carries two rifle-calibre machine guns in the "valley" between the wing roots, troughs being provided for two similar weapons in the sides of the fuselage.

Cockpit protection, allowing a gunner to use his weapon freely at high speed, is a matter receiving universal attention, particularly in Europe and America. The Mureaux 180 C.2 two-seater fighter mentioned previously employs a system not unlike that developed by the Westland Aircraft Works with telescopic rear portion, but it is on the

French *multiplace de combat* types that the most interesting methods of mounting armament are to be seen. The usual formula seems to be one gun in a revolving turret in the nose, one sheltered position on top of the fuselage behind the wings, and another firing beneath the fuselage, with, possibly, another gun in what is known as a "secondary" position like that in the floor of the hanging "car" of the Amiot M.142. With the advent of sheltered gun positions, twin guns on a common mounting are being revived. Previously it took a very powerful gunner to swing a pair of guns round on a gun ring while exposed to the slipstream. There are very ingenious turrets on certain of the French "heavies," but none of them appears to be quite so well developed as the Boulton Paul type on the "Overstrand."

One was surprised to see at the Paris show that even on the modern multi-seater machines a large portion of the bomb load is still being carried below the wings or fuselage, but as fuselage size is being kept as small as possible, and an amazing array of gadgets is being carried internally, there is very little room for internal stowage. In fact, it is obvious that with gun turrets and external bomb racks, armament is having a serious effect on the performance of several Continental types, and the comparatively high speeds claimed are attained mainly through the installation of enormous engines.



The Hispano-Suiza Ycrs. *moteur canon*. The gun lies between the cylinder banks and fires through the centre of the geared airscrew shaft. Sixty rounds are provided. The engine is rated at 860 h.p.

A 200 M.P.H. AMPHIBIAN

The Sikorsky S.43 is Expected to Set a New Standard for its Type

BY its very nature, an amphibian machine must necessarily compare unfavourably in general performance with either a pure land- or seaplane, but the estimated figures for the new Sikorsky S.43, a 16/25-passenger twin-engined machine, show what can be done with careful design.

Semi-cantilever wing construction, a landing gear which is virtually "flush" in the flying position, and retractile wing-tip floats make for unusual cleanliness, while constant-speed Hamilton Standard controllable pitch airscrews and a hydraulically-operated trailing edge flap permit a high maximum performance consistent with a quick take-off and a reasonably slow landing. Interesting structural features include semi-monocoque construction for the hull, which is built with five separate watertight compartments and treated to prevent corrosion; and all-metal internal structure for the wing, which has a single box spar and a removable leading edge. The wing is strut-braced to the engine mountings and is carried well above the hull.

Two of these machines are being constructed for Inter Island Airways, Ltd., of Hawaii, who have an option for two more; they will be put on services between Honolulu, Hilo and Kauai. I.I.A. at present use S.38s, and the company has the mail contract over its routes. Pan American Airways, Inc., have also ordered four of the new type, and these will probably be put on the South American routes.

With two Pratt and Whitney "Hornet S1E-G" radials, each developing 750 h.p. at 7,000 ft., the estimated performance and other figures are:

Top speed at 7,000 ft.	200 m.p.h.
Cruising speed (75 per cent. full power) at 8,000 ft.	181 m.p.h.
Top speed on one engine at 7,000 ft.	125 m.p.h.
Service ceiling on one engine	7,000 ft.
Initial rate of climb	1,250 ft./min.
Stalling speed	65 m.p.h.
Weight empty	10,021 lb.
Weight loaded	17,500 lb.

A Big Monospar

General Aircraft, of Croydon, have decided to start work upon a low-wing commercial monoplane. This machine will carry ten passengers and crew of two, and will be powered with two Armstrong Siddeley "Serval" engines or similar air-cooled radial or in-line engines of about 300 h.p. each.

Biggin Hill: Target-towing Practice

An Air Ministry Notice to Airmen states that, until January 28, Royal Air Force aircraft will be engaged in target-towing practice over the open country lying to the north and east of Biggin Hill aerodrome.

Towing will take place only in daylight and in good visibility, with a cloud base not below 1,000 feet. The length of the tow will not exceed 1,000 feet.

(Photograph by Aerofilms)

FLY ON

NATIONAL

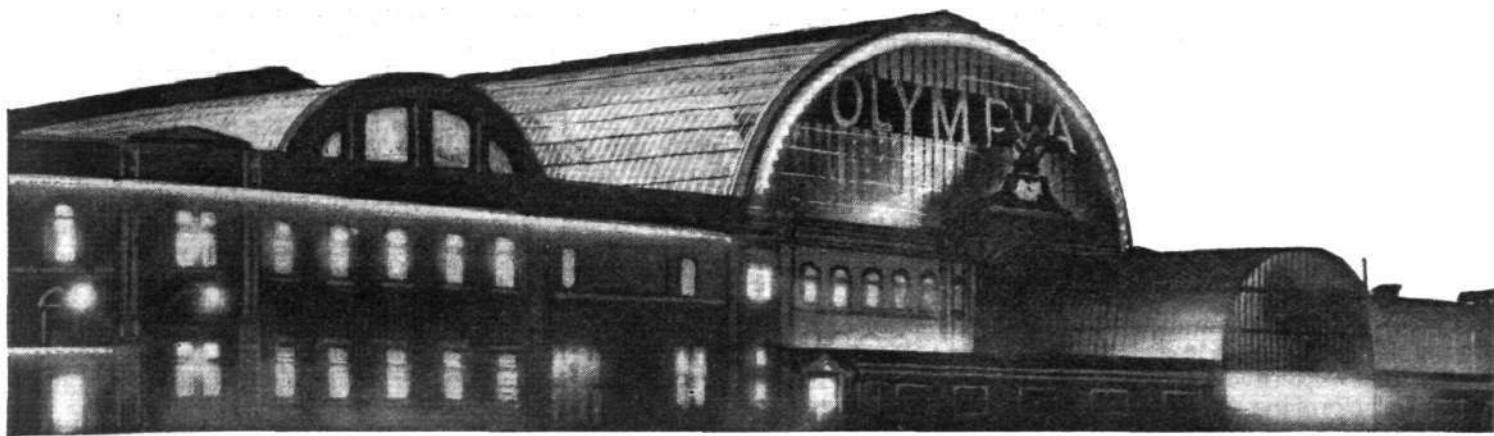
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THE HAWKER HIGH-SPEED "FURY" modified since its last appearance in public. A later type engine has been fitted and the performance shows a marked increase.



AN AERO SHOW THIS YEAR?

For and Against : the Views of Constructors and Others

IN a leading article last week *Flight* discussed the desirability of holding a British aero exhibition this year, either at Olympia or elsewhere. Some members of the industry appear to be strongly in favour of the idea; some would like to see a compromise, such as an extension of the S.B.A.C. Show at Hendon, the public being admitted on the second day; others feel that the possible return would not justify the cost of a show—at all events one held at Olympia.

Their views make interesting reading. For instance, Mr. F. N. St. Barbe, of the De Havilland Aircraft Co., Ltd., writes as follows:—

"I may say that I, and I speak for all my colleagues, am very keen on another aero show—and soon; but it is rather my personal opinion, which I hold very strongly, that the event should take place at Olympia. I mention this as being my personal opinion because others of us are inclined to suggest that another show should take place at an aerodrome, the exhibits being housed in marquees on the lines of an agricultural show.

"Those who argue for this scheme are influenced by the very reasonable consideration that the serious buyer would expect to have flying demonstrations. While this is a very good point, my fear is that an aero show at an aerodrome would not locate it with sufficient convenience for the man in the street, while it remains perfectly easy for the serious buyer to visit the factory and aerodrome of any particular manufacturer in whose products he was interested.

The Man in the Street

"My principal reason, therefore, in recommending Olympia is that it is the venue for such events to which the man in the street is accustomed, and in this connection I cannot believe that the show need be an expense to exhibitors; in point of fact I believe that it could be made to pay. An enormous proportion of the population is now mildly interested in aviation, and, given the most spectacular possible exhibition right in their midst, I feel sure that a very large crowd of visitors could be expected.

"The failure of the last show was due, in my opinion, to two causes. First, it was nothing like sufficiently advertised, and, secondly, it closed just at the very hour when the pleasure-seeking Londoner wants something to occupy his evening. For these reasons another show would have to be managed with the utmost skill. The most effective and widespread publicity would be necessary, while the show itself would have to be arranged to offer the maximum of attraction. For this reason I suggest that it should include every type of aircraft. It should include an historical section, and I feel that there are many ideas for enhancing the attraction of the event.

"Those who hold that a flying display should be organised at the same time need not necessarily be denied, and there is no reason why an aerodrome in the neighbourhood of London (Hendon, for instance) should not be taken for a regular programme of displays and demonstrations. Personally, however, I should be inclined to do nothing to detract from the show proper in order, primarily, to get sufficient public sup-

port to cover its cost. I am sure that this scheme would not keep a serious buyer away because, as I say, he can easily be taken to see any factories or aerodromes in which he may be interested, and, incidentally, we should not be wasting so much time and expense over demonstrations to people who were not serious.

"When I emphasise that the show would have to be most competently organised and run, I do not want to suggest that there is any lack of commercial competence in the matter of personnel of the aircraft industry. On the other hand, we may not be expert showmen, and I feel that the success of such an event would depend very largely on its handling by experts at the game.

"Finally, there is the difficult question of the time of year. While, admittedly the summer is best for flying demonstrations, and that there may be more overseas visitors to England at that time of year, the man in the street is less inclined to amuse himself in London at night during the long evenings. The whole subject merits a good deal of discussion and consideration."

"At the Earliest Possible Moment"

The managing director of a world-famous firm of aero-engine manufacturers writes:—

"The question of the S.B.A.C. holding an aero show at the earliest possible moment is something that I have advocated for a year or more.

"I do not necessarily say that it should be at Olympia, but I do maintain that a show should be held, even if it were in a small hall and confined to civil aviation.

"We let the French have their bi-annual show and go there to exhibit!"

An interesting point is raised by the managing director of a well-known firm of light-aircraft manufacturers, who makes a comparison with car shows. He is in favour of a show, but is against making it an annual affair:—

"I think the advisability of holding such a show depends almost entirely on the matter of cost. Speaking generally, I do not believe the trade is strong enough financially to subsidise the industry for the future. I do not think it would be good policy to spend a large sum of money, knowing that it would not be recovered immediately, and relying on the building up of demand in the future.

"On the other hand, if it could be worked economically, I should imagine an Olympia show would be an excellent medium for keeping in touch with foreign buyers.

"To give you an idea of what I mean by 'economically,' I consider that the Paris Show was several times too expensive.

"Strictly from the business or trade point of view, and quite apart from expense, I think it would be a great pity to establish a yearly aero exhibition on the lines of the Motor Car Show. In my opinion it will be a bad day when manufacturers of aircraft bring in yearly models. Aeroplanes should not be dated; successful types should be allowed to run for a number of years without having the drawback of being dated as such and such a year's model.

"If models are to be altered religiously during the change-

over period every year, works would have to be closed down and the whole sequence of work would be interfered with, with a result that the cost of production would be increased. The idea, of course, is for manufacturers to be able to plan steady production throughout the twelve months, bringing in new types as and when they think fit.

"To sum up, I should be quite pleased to see an aero show towards the end of the year, so long as it was understood that it was not to be a yearly occurrence, and, last but not least, if it could be organised cheaply. If the expense is going to be prohibitive and approaching anywhere near that of the cost of the Paris Show, I should say 'no' definitely."

Typical of the letters suggesting that, while an exhibition is desirable, an extension of the Hendon Show would be the least expensive solution, is the following. It is from Mr. Nigel Norman:—

"I personally do not think that the expense of a show at Olympia would be justified from the industry's point of view."

"I think a second day to the S.B.A.C.'s Show at Hendon, to which the public would be admitted, would be much better value."

The point is elaborated on by a representative of a well-known air-line operating company, who writes:—

"The exhibitors must in the main be aircraft manufacturers, and the display at Hendon on the Monday following the R.A.F. display seems to me to give a vastly better chance of selling aircraft than any show at Olympia could do."

"From the point of view of propaganda for the whole industry, again the R.A.F. Display and the S.B.A.C. Show on the following Monday, where aircraft can be seen in action and not merely on stands, is a more attractive and more telling form of propaganda than any show indoors, and particularly as it can be reserved for people seriously interested in aviation, and the schoolboy and casual sightseer will not hamper the seriously interested people in their inspection of the aircraft."

"If, on the other hand, one wants to take the long view and educate the youth of the country and the potential air passenger, so that in due course more people will take to the air and more aircraft will, therefore, be required, I do not believe the best form of education will be obtained by an exhibition of aircraft, engines, instruments, etc., at Olympia."

"Personally, I hold the view that the organisation of the S.B.A.C. Display on the Monday following the R.A.F. Display meets the needs of the industry in a way that would be hard to beat."

An extremely ambitious scheme is put forward by a member of a famous aircraft accessory firm, who favours a combined indoor and outdoor show on a large scale. He writes:—

"I believe that if we really were to organise on the right lines we could put over a show which would be remembered for many years. My idea would be that the show should take place about the same time as the R.A.F. Display and British Empire Air Week, and I should imagine that it would be quite possible to fill every aerodrome round about London, and to see a fine show of flying boats on the Thames."

"Can you not see flying parties from every municipality in the country organised to attend the show, which may be opened by one of the highest personages in the realm?"

"Forgive my youthful enthusiasm, but we all still feel very young in this still very young industry of ours!"

A representative of an organisation closely interested in aeronautical matters gives it as his opinion that:—

"The last two exhibitions held by the S.B.A.C. at Hendon on the day following the R.A.F. Display have been so excellent that I think it should be considered whether an aero show could not be held in conjunction with that function in the future. I am fully aware that there are many difficulties in the way of doing this, but from the point of view of sales the Hendon Show is invaluable."

He adds that, while he is interested in the idea of an Olympia Show, he feels it would be a little too premature if held this year. "I feel that in 1936 we shall be in a very much better position to show the world what we can do in this line," he says.

Among the members of the industry who are satisfied with present arrangements is the managing director of a famous firm of engine manufacturers, whose opinion is brief and to the point:—

"I do not think we want an Olympia Exhibition. I am certain that the Display at Hendon fulfils all our requirements in an adequate manner."

Various Opinions

Some miscellaneous views, in brief, are worthy of quotation:—

"Speaking for myself, I feel that we ought to have an Olympia exhibition. The trade will, no doubt, be able to put their own point of view as regards expenses, etc."—Lt. Col. J. T. C. Moore-Brabazon, M.C., M.P.

"The aircraft constructors themselves would probably benefit most from an Olympia show, and suppliers of raw materials, such as ourselves, will leave the decision in their hands."—A manufacturer of aircraft constructional materials.

"Coming from the Paris Show, I am afraid I have decided that these shows are not worth while, for many very obvious reasons, but I suppose they *have* to be held at intervals. I imagine it is mostly a matter for the trade, who have to bear the cost."—Air Comdre. J. A. Chamier (Secretary-General, Air League of the British Empire).

"We think that an exhibition is certainly very necessary, and that it is quite time we had a sound and well-organised exhibition in this country before the Paris Show, in order to attract Continental buyers. It occurred to us that an extension of the S.B.A.C. Exhibition normally held at Hendon to include a larger display of engines and general static exhibits, combined with a flying display spread over more than one day, might serve the required purpose and be cheaper than an exhibition at Olympia."—A well-known concern manufacturing aircraft wireless equipment.

"We are of the opinion that while an Olympia exhibition would produce extensive publicity it would not be likely to produce sufficient interest in the travelling public to be of any material benefit to air transport. It seems to us that the only people likely to visit such a show would be those who are already interested in aviation. We cannot, therefore, see that the cost involved would be justified."—A prominent air-line operating company.

A CARBURETTER FOR FUEL OIL

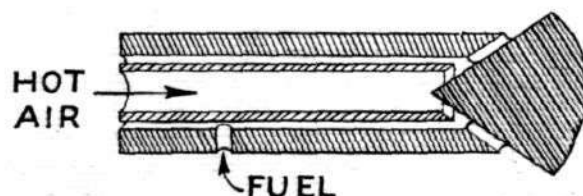
EXTREMELY interesting possibilities appear to exist in the "Atomigaz" carburetter, which is the subject of patents by M. Claudel. This carburetter has already come through extensive trials on motor coaches in Bristol and on numerous motor cars both in this country and on the Continent.

The chief point is the arrangement of the main jet, which, as the sketch shows, provides means whereby a continuous stream of hot air is drawn through the centre of the jet and mixes with the fuel at a point where it impinges on a hot-spot. This, it is said, enables fuel oil to be vaporised perfectly, and its use in ordinary internal-combustion engines necessitates no alterations to the engine whatsoever; moreover, it is claimed that the vaporisation is so good that the carbon deposit is less and the engine functions perfectly satisfactorily.

For use with heavy oil the carburetter has two float chambers, whereby petrol is taken from a by-pass jet for idling and starting up; this supply is cut off as soon as the throttle is opened, so that the engine then runs on the heavy

fuel. This opens up great possibilities for use in aircraft, particularly as there is very little idling, and the petrol tank which would have to be carried for this purpose and for starting would only have to be very small.

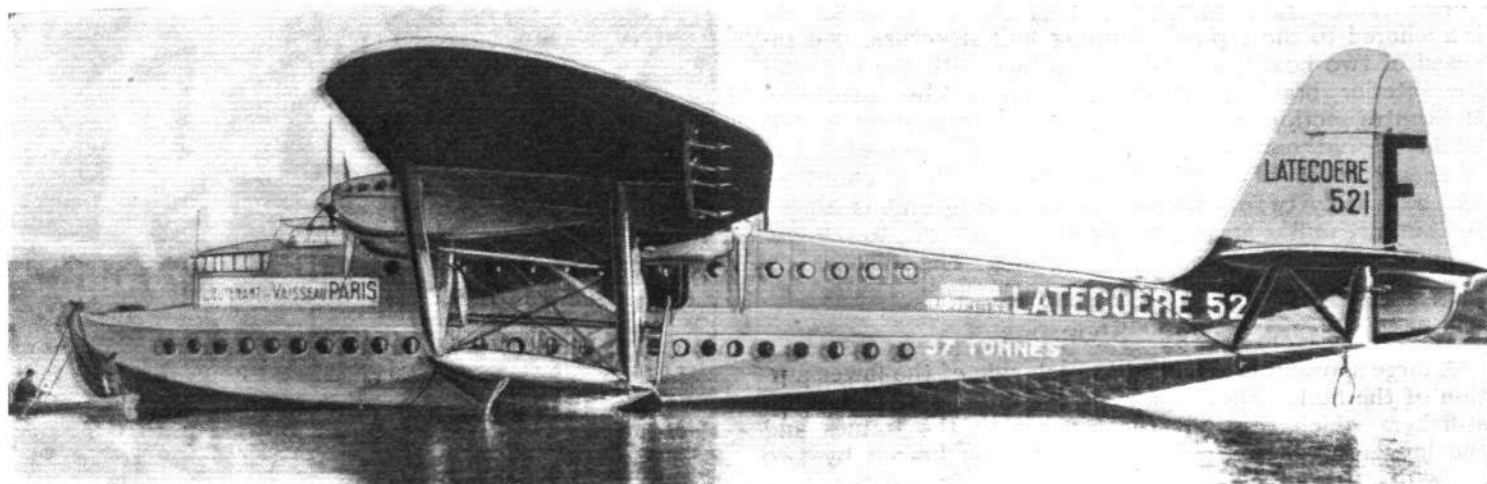
On the score of both safety from fire and low cost of fuel it seems probable that Mr. Norman Edgar has done a very good thing for aviation by introducing this carburetter. Further details can be obtained from him at Western Airways, Ltd., Bristol, as he is handling it in this country.



This sketch shows diagrammatically the vaporising principle.

THIRTY-SEVEN TONS in the AIR

First Tests of the French Latécoère Transatlantic Flying Boat : Six 860 h.p. Hispano Engines : Seventy-two Passengers to be Carried on Short-range Journeys : De Luxe Cabins—with Furniture!



An outsize in aircraft : The big Latécoère flying boat at the Biscarosse seaplane base during its trials.

THE new Latécoère 37-ton flying-boat, the *Lieutenant Paris*, which is equipped with six Hispano-Suiza 860 h.p. liquid-cooled engines, began its trials at the Biscarosse seaplane base last week. With a six-ton load this machine made its initial flight around the lake on January 16, flying at a height of about 600 ft. These tests will be continued with gradually increasing loads until a loaded weight of 37 tons is reached.

One of the largest boats yet constructed, the *Lieutenant Paris* has been designed as a passenger transport and postal machine which can be adapted for several different services. For operation on the Air France Marseilles-Algiers line, the machine can be equipped to transport seventy-two passengers with a crew of four. Its total weight for this service will be 69,519 lb. (approximately 31 tons), divided as follows:—

Weight empty, including equipment	43,454 lb. (19 750 kg)
Fuel	9,394 lb. (4 270 kg)
Crew (four men)	880 lb. (400 kg)
Seventy-two passengers	15,791 lb. (7 170 kg)
Total	69,519 lb. (31 590 kg)

For the South Atlantic crossing, Dakar (French West Africa) to Natal (Brazil), some 2,000 miles, the *Lieutenant Paris* will carry its full load of fuel, 5,333 Imperial gallons, and thirty passengers, in addition to the mail and freight. In making the trip from France to the United States, it is designed to make the crossing with a stop at the Azores and transport twenty-four passengers. In both these crossings the machine, when fully loaded, will weigh thirty-seven tons. The following are the estimated performance figures in fully loaded condition:—

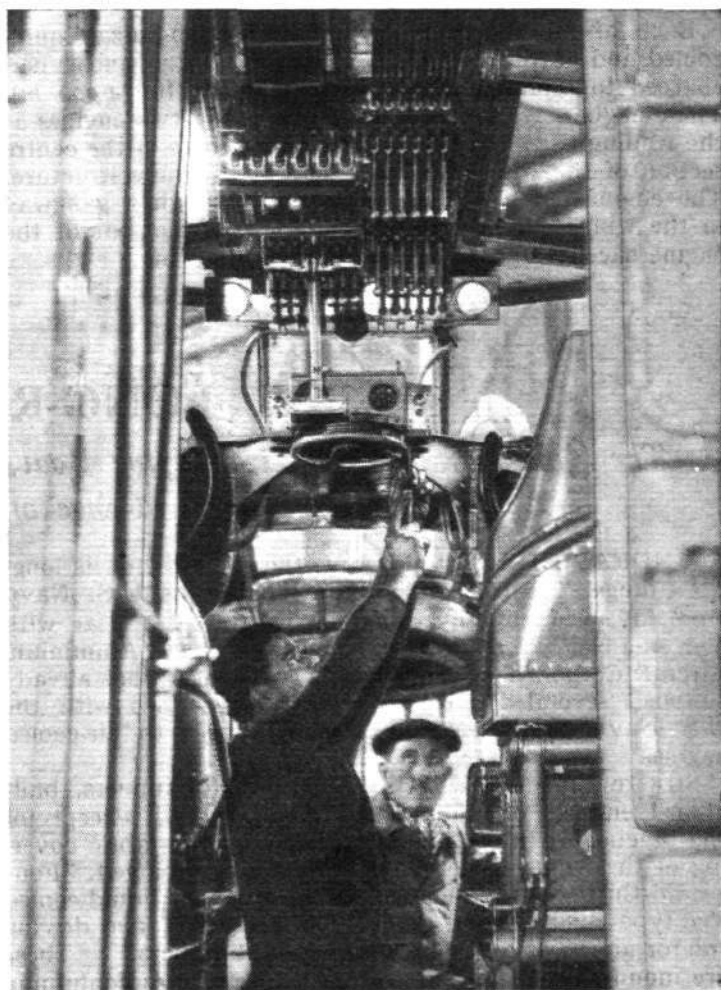
Speed at ground level, 156 m.p.h. (250 km/h); speed at cruising height, 125 m.p.h. (201 km/h); ceiling, 16,400 ft. (5 000 m); range with no wind, 2,812 miles (4 500 km).

The *Lieutenant Paris* is constructed of duralumin and stainless steel throughout with the exception of the fabric covering of the outer wing panels and the tail. The hull consists of two sections: the main hull and the superstructure which covers almost its entire deck.

The main hull is constructed with a heavy keel and equipped with two steps. It is divided into seven watertight compartments, in which all the longerons, stiffeners and cross struts are of open section and easily inspected. The forward part of the hull contains a hold for storing

mooring tackle, anchors, and so on. Three compartments directly aft of this hold are fitted with armchairs and folding tables to accommodate ten first-class passengers, six *de luxe* cabins each containing two beds, a wardrobe and a private bathroom. A bar and a kitchen, together with the second-class cabin, are arranged in the after hull.

The captain's and navigator's cabin is located in the nose of the upper section of the hull. The pilots' com-



A symphony in knobs: The pilots' compartment of the big Latécoère, suggestive of the interior of a submarine.

partment, fitted with dual controls, is installed directly aft of the captain's room and the radio compartment and mechanics' quarters behind it. A gangway, giving access to the engine nacelles, is located in the centre of the upper structure, and the rest of the space toward the stern is devoted to a cabin fitted with accommodation for the forty-two second-class passengers. A flight of stairs connects the cabins situated in the main hull and superstructure.

The framework of the wings, of which the centre section is anchored to the top of the upper hull structure, is composed of two box spars which, together with the ribs and the interior bracing, are of duralumin. The surface of the centre section is covered with duralumin sheet metal, while the outboard wing panels are fabric covered. The wing profile is of medium thickness with a chord of approximately twenty-five feet. This wing unit is braced by four streamline struts, mounted in Vee form, to the two stub wings which serve as planing fins. The ailerons are aerodynamically compensated.

Large Sponsons

A large sponson is attached to each side of the lower portion of the hull. These sponsons are made with numerous stiffeners which transmit the stresses to the frames and the longerons of the hull. Each is also braced by two pairs of streamlined struts mounted in Vee form to the wing above it. In order to augment lateral stability on the water and to damp out shocks, the ends of the sponsons are built so as to bulge underneath, thus forming wing tip floats. The petrol tanks, containing 528 gall. (2 400 l) are located in the sponsons, each containing three separate compartments, so that the engines can be fuelled separately. Two intermediate fuel tanks of 111 gall. (500 l) each are located in the wings.

The framework of the tail is constructed of duralumin and fabric covered. The tail plane is braced by struts to the lower part of the hull. The elevators and rudder are aerodynamically balanced.

Each of the six twelve-cylinder Hispano-Suiza liquid-cooled and geared engines is rated at 860 h.p. and supercharged to establish this power at 13,123 ft. (4 000 m). These engines are mounted in four groups: two engines at the leading edge and one at the trailing edge of the centre section of the wings on either side of the superstructure. The engine mountings are accessible through a gangway in the wing. Radiators are mounted in the rear of the engine nacelles under the lower side of the wing.



This view of the tail unit during assembly gives an idea of the Latécoère's size—note the man standing by the rudder.

The following are the general characteristics:—

Wing span, 160 ft. (49.30 m); length, 103 ft. (31.62 m); height, 29.5 ft. (9.07 m); wing surface, 3,554 sq. ft. (330 sq m) Total horse-power, 5,160.

R. C. W.

FOR LONG-RANGE PATROL

*The American Hall XP2H1 Flying Boat, Built Almost Entirely of Aluminium Alloy :
Range of 4,560 miles*

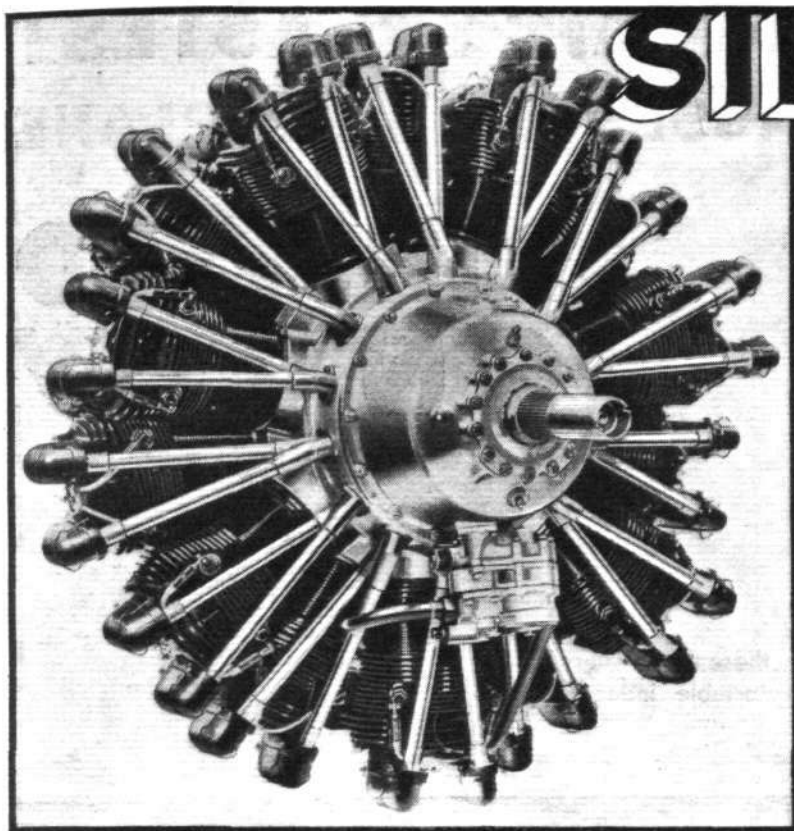
ENDEAVOURING to improve the efficiency of its long-range "patrol"-type flying boats, the U.S. Navy has been experimenting during the past year with the Hall XP2H1, constructed by the Hall Aluminium Aircraft Corporation, of Buffalo. This concern has already supplied several "patrol" aircraft for service with the U.S. Navy, in the main of biplane type with air-cooled engines.

Structurally, the XP2H1 is, like its forerunners, built almost entirely of aluminium alloys. Indeed, except for the bracing wires, engine mountings and the fabric covering of the wings, no other materials are employed. Four geared Curtiss "Conqueror" twelve-cylinder liquid-cooled Vee-type engines rated at 650 h.p. are fitted, two driving tractor airscrews and two working as "pushers." These are mounted in pairs on streamlined structures containing the radiators and drive three-bladed metal airscrews. The boat can be flown on any two of its engines, the perform-

ance with the two tractor engines working being little different from that with the two "pushers."

This selectivity of power plants offers a considerable extension of the cruising range. Taking off at a weight of 42,500 lb., with 3,400 gallons of fuel, and cruising at 120 m.p.h. on four engines, the calculated range is 3,603 miles. If use is made of four, three or two engines, as required, flying at economical speed, the range becomes 4,560 miles. With all four engines working at economical speed the range is 4,250 miles.

Despite the fact that the machine is a biplane, it has a span of 112 ft. Its empty weight is 20,417 lb., and, equipped for "patrol" work, the gross weight is 34,800 lb., which figure is increased by 180 lb. when bombing duties are undertaken. On at least one occasion the XP2H1 has taken off at a gross weight of 43,000 lb.—more than 21 tons. Its top speed, 140 m.p.h., must also be considered good for a boat of its class.



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LEADING DETAILS

Aircooled radial type. 14 cylinders. Moderately supercharged. Maximum flight power 625 h.p. at 6,700 ft. with a take-off power of 592 h.p. at sea level. The Panther engine is also available in a fully supercharged form.

A Panther engined Fairey Seal seaplane of the Fleet Arm being placed on its catapult aboard one of H.M.'s. battleships.



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OUR INTERNAL AIR LINES —WHAT of the FUTURE?

A Consideration of some of the Points Raised at the Air Transport Conference : The Need for a System of Trunk Routes

By C. N. COLSON

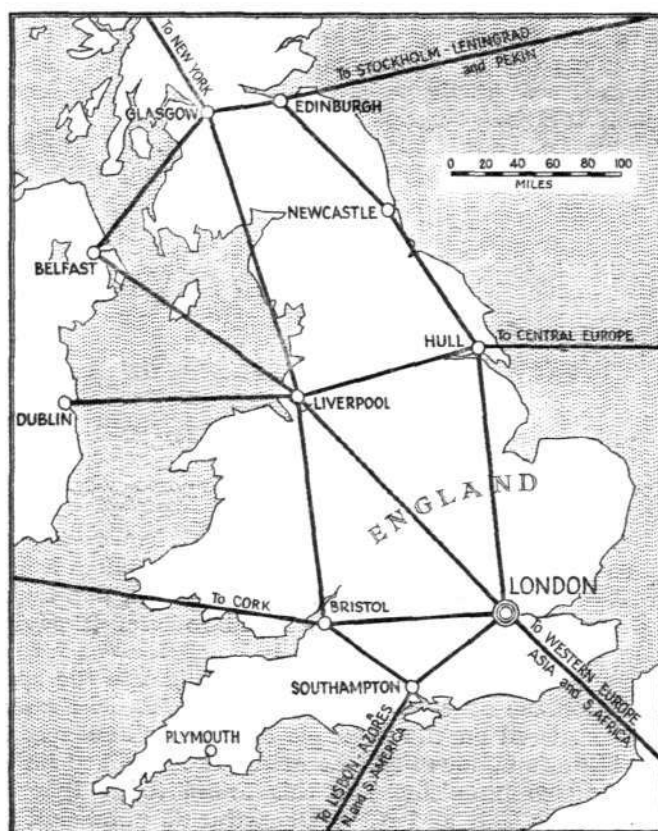
CONFERENCES are of two kinds. One variety, beloved of trades which sell articles direct to the public, forms an opportunity for agents and others to get together and promote better business by *bonhomie*. The Air Transport Conference was of the other kind; it was one of those particularly useful conferences which carry out their aim of making people interested in something and of showing how the particular matter can best be furthered.

Now that it is over it behoves us to consider what has been achieved. The most obvious matter which was brought to light was the memorandum which the London Chamber of Commerce has laid before the Government on the subject of the control of inland air development. That memorandum sows the seeds for much thought. For example, is it desirable that the establishment of aerodromes should be encouraged throughout the length and breadth of Great Britain? We feel that such encouragement should not be made without reservation. Aerodromes are wanted, admittedly, but there is a grave danger that municipalities may be encouraged, by misplaced publicity, to establish and finance large, well-equipped airports where there is little hope that they will ever be wanted; then, as a natural result, the municipalities will never get an adequate return for their expenditure.

There has, perhaps, been insufficient differentiation in the past between an adequate landing ground and a well-equipped airport. The latter is costly and should only be placed where the traffic probabilities warrant it; the former costs but little and is not only a great asset even now, but will soon be a necessity for any town which wishes to retain its commercial position. The danger of encouraging municipalities to spend far more than is necessary is that they may become (and rightly) disgruntled and dubious about the so-called experts who advised them; then they will spread seeds of distrust about aviation as a whole, to the detriment of everyone concerned. It should always be remembered that municipalities do not, as a rule, know very much about the air. They, therefore, look to accredited advisers to help, and, unless that advice is such as to establish each municipality's airport or aerodrome as an undertaking which proves worth while, aviation will suffer.

A Scheme Outlined

Now, a careful study of the situation would seem to indicate the need for the establishment of a system of main trunk air lines which will link up with those points at which the international lines will be likely to enter our Islands, and the diagram on this page offers a suggestion as to how they might run. This is, of course, merely a framework upon which a more far-reaching system can be built, and in no way limits the establishment of aerodromes throughout the length and breadth of the country. It offers a suggestion as to where large airports are already wanted, and may give some indication of where they are not likely to be financially successful. The lines suggested may be looked upon as the main bad-weather routes primarily serving international traffic. On them will also run shuttle services between our major towns. When exam-



A suggested scheme of internal main air lines.

ining a scheme of this nature it must always be borne in mind that internal air lines have to face both a very high percentage of days of bad flying weather and a highly organised ground transport system with which it will be difficult to compete.

The main use for internal lines (other than the trunk lines) will undoubtedly be on ferry services, such as that over the Severn from Bristol to Cardiff, those to the Isle of Wight and the Isle of Man, and similar routes where even a low speed through the air results in a much faster trip than by surface transport. These lines do not, therefore, come into our present discussion to any great extent, and, except in so far as they use the airports indicated, it is best to look upon them as part of the branch-line system which will grow out of the main scheme.

Aerodromes can be divided into two categories: those which pay on their own merits, and those which are an indirect benefit to their town. In the first case, the airport itself actually pays a dividend. The main trunk lines will use these airports, and these are the kind which we indicate on our diagram as worthy of having considerable sums of money spent upon their development. The latter kind are purely landing grounds. They need have very little spent upon them and are valuable only because of the trade, whether it be in the form of visitors or direct commerce, which they bring by air. This is the kind which is needed by almost every town of any consequence.

So much for generalities. Turning again to our diagrammatic development scheme, it will be seen that we show traffic from New York coming into the country through Glasgow. This is, naturally, supposition, but there is considerable weight of evidence to make it seem probable that the northern route over the Atlantic *via* Greenland will be found to be the most suitable. The stages are short and, therefore, the payload of the machines can be kept large. In winter this route may not prove to be practicable, and that over the Azores may be taken. Traffic will then prob-

ably come in at Southampton, where that from South America and possibly the West Coast of Africa will also arrive. Southampton seems to be the logical point of entry, although one cannot be dogmatic on that point and must not forget that Plymouth also has a harbour suitable for large flying boats. The Great Circle course over Russia makes Edinburgh look like the most probable port for that part of our air traffic, just as its position allots to Hull the traffic from Germany and Central Europe. In this latter case we already have a good pointer in the service which K.L.M. ran there last year.

Coming finally to London, we feel that traffic will have to be segregated and, as a possible scheme, that from

Southampton, Bristol, and Liverpool may go to Heston, that from the East Coast route to the North to Stapleford Abbots (Essex Airport), and the Continental traffic may be divided so that of the Paris traffic, which may well be called "suburban" traffic, some comes to Gatwick and some to Stapleford Abbots, thus leaving Croydon free for Imperial Airways traffic to the East and to Africa.

The extensions of the system to Ireland presuppose a demand either for actual traffic with that country or to cater for accelerated mails services connecting with Transatlantic steamship services which may be established before flying boats or aeroplanes are actually running across to the United States.

A GROUND-SPEED METER

Gatty Instrument Based on Utilising Constant-speed Film and Geometry of Similar Triangles

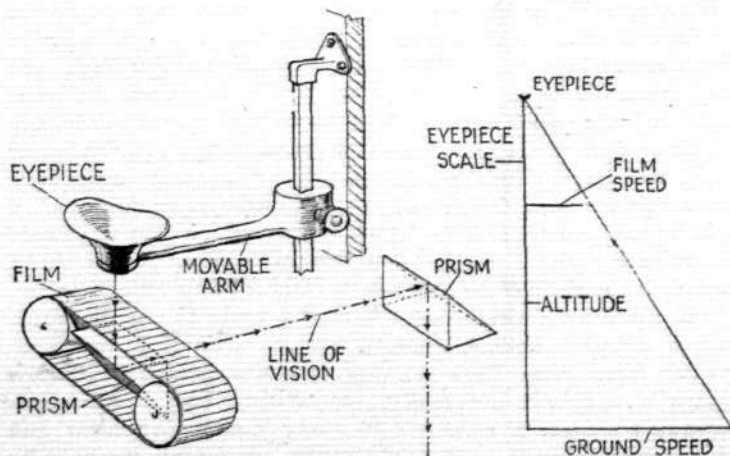
THE names of Harold Gatty and Wiley Post first became known to British readers of *Flight* through their round-the-world flight in 1931. Gatty was the navigator of the party, and has always taken a keen interest in all subjects related to that art. (It can hardly yet be called a science when applied to aircraft navigation.) Quite early Gatty began to toy with the idea of developing an instrument which would indicate the speed of an aeroplane over the ground or sea. His first instrument was based on the principle of the stroboscope. On his and Post's famous flight he used a more refined instrument, and so promising was this found to be that the United States War and Navy Departments purchased the Government rights, and the Army Air Corps and Bureau of Aeronautics took over its further development.

In its latest form the Gatty ground-speed meter consists essentially of an endless film travelling at constant speed over two rollers. The image of an object on the ground is viewed through an eye-piece, the height of which above the film is adjustable. Elementary geometry tells us that the two triangles formed by (a) the eye-piece, film, and eye-piece scale, on the one hand, and (b) eye-piece, height of eye-piece above the ground, and strip of ground, on the other hand, are similar. From this it follows that if the altitude of the aircraft above the ground or sea is known, and the distance between the eye-piece and the film is adjusted until the image of an object on the ground is seen travelling across the field of vision at the same apparent speed as lines scribed on the constant-speed film, the speed over the ground can be calculated. Putting the problem into the geometrical language of our school days,

as the ground speed is to the film speed so is the altitude to the eye-piece scale. From this it follows that ground speed equals film speed multiplied by altitude and divided by the eye-piece scale.

The actual instrument differs somewhat from the diagrammatic representation which we show, and which is based on information and diagrams published in the American journal *Aero Digest*. For example, a few moments' study of the subject will show that, in order to make the instrument applicable to a large range of altitudes and speeds, the distance between the eye-piece and the film would have to be variable over very wide limits—so much so that it would be awkward to use. To avoid this a three-speed gear box has been provided, a gear ratio giving fast film speed being used when the machine is flying low and at high speed, and a low film speed for flying slowly and/or at considerable height.

It will be obvious that the results are affected by drift, and, in fact, the Gatty instrument can be used for calculating both ground speed and drift. Mr. Gatty claims that an accuracy of half a degree on course and 1 m.p.h. on speed can be attained. Even if the errors are considerably greater than that, the instrument should still be very useful. The one serious drawback is, of course, that the ground-speed meter cannot be used when flying out of sight of the ground, but for all that it should have a useful application in air navigation. Inaccuracies in altitude will also affect the results, but often it should be possible, in cases of doubt, to descend to sea or ground level to reset the altimeter.



Diagrammatic representation of the Gatty ground-speed meter. On the right are shown the similar triangles which form the geometrical basis upon which the instrument functions.

Control Comfort

PRIVATE owners are offered a great deal more comfort nowadays than they used to be—a wise provision which shows that manufacturers now realise that people who can own aeroplanes are not the class to be content with third-class comfort. Comfort does not merely consist of a soft seat. The controls can equally contribute to the desirability of an aeroplane and make it comfortable or the reverse. Take, for example, the Avro "Commodore" which Henly's, as the Avro agents, now have at Heston. A member of the staff of *Flight* was very struck with its "control comfort" when flying it recently. It is based on the Avro "Tutor" and, although now a cabin machine, it retains all that distinctive control-feel which made the "Tutor" machine so well liked as a training aeroplane. This is not always the case when a cabin aeroplane is evolved from an open version, but the Avro "Commodore" shows that it can be done successfully. It has not that very marked degree of positive stability which is looked upon as necessary by the majority of American designers of aeroplanes comparable with the "Commodore," but the controls are equally balanced, and therefore cause no discomfort on a long journey, even though they may have to be used constantly.

FOREIGN AIRCRAFT

CZECHOSLOVAKIAN "MULTI-GUN" FIGHTER

Bristol "Mercury" Engine in Letov S.231

DURING 1933 the Vojenská Továrna Na Letadla built a high performance single-seater fighter, equipped with four machine guns, and using a Bristol "Mercury" IV S.2 engine, known as the type S.231. The "Mercury" IV S.2 has since been replaced by a later mark of the "Mercury," the VIS, and a Siddeley "Tiger III" (610 h.p.) and Gnome Rhone 14 Kfs. (900 h.p.) have been fitted experimentally. Unusually complete wind tunnel tests were made with models of the fuselage of the aircraft to determine the best shape to provide efficient cooling for the engine.

The machine is a staggered biplane of unequal span with dihedral on the bottom wings only. Struts of a modified "N" formation, braced with wires, carry the centre section of the top plane above the fuselage. Two duralumin spars of rectangular section, ribs of pressed duralumin sheet and fittings of high-grade steel are used for the wing structure. Ailerons of duralumin, aerodynamically and statically balanced and mounted on ball bearings, are fitted on the bottom wing only.

Steel tubular construction is used for the fuselage, which is rectangular in shape. The forward portion is rigidly braced and fastened with bolts and rivets, and the rear portion is of welded chrome molybdenum steel tubes braced with steel wires. Metal panelling and fabric fair the fuselage to an oval section. The engine mounting is of welded steel tubes and is joined to the fuselage by four bolts. An adjustable tail plane is fitted and the tail surfaces are statically and aerodynamically balanced. Controls are of conventional type, the rudder bar being adjustable.

Single-strut Undercarriage

An original single strut type of undercarriage is employed, each of the two struts being braced by three streamline steel wires. Pantof oleo pneumatic shock absorbers are carried within the fuselage, and Dunlop wheels and brakes are fitted.

The prototype S.231 is fitted with a Bristol "Mercury" IV S.2 engine (560 h.p. at 16,000 ft.), cowed with a low drag ring in several easily detachable parts. When later marks of the "Mercury" engine are fitted, a combined exhaust collector and cowling ring will be used. The main petrol tank is in the fuselage and a small gravity tank is carried in the centre section of the top plane. A sheet metal oil radiator is mounted beneath the fuselage and fitted with adjustable shutters.



A Four-gun Fighter : Four machine guns are carried on the Letov S.231.

Either a Viet or a Walter Mechano starter is used for the engine.

An easily adjustable seat is provided for the pilot. This seat is designed to accommodate a back type parachute which fills the back of the seat in a similar manner to that in which seat pack parachutes fit into the pilots' seats of most British fighters. Armament consists of four "outboard" machine guns mounted with their ammunition boxes in the lower planes. Electrical, wireless, oxygen, navigating and signalling equipment is carried.

The performance figures given in the accompanying table were obtained when the machine was fitted with a "Mercury" IV S.2 engine using a wooden airscrew. With the Gnome Rhone 14 Kfs. "Mistral Major," in which form the machine was shown at Paris this year, the top speed is claimed to be about 250 m.p.h., the climb to 16,400 ft. taking six minutes.

LETOV S.231
Bristol "Mercury" IV S.2 (560 h.p. at 16,000 ft.)

Span	33 ft. (10.06 m)
Length	25 ft. 9 in. (7.85 m)
Height	9 ft. 10 in. (3 m)
Wing area	232 sq. ft. (21.5 m ²)
All-up weight	3,594 lb. (1 630 kg)
Maximum speed at 16,400 ft. (5 000 m)	216 m.p.h. (348 km/h)
Maximum speed at ground level	186 m.p.h. (300 km/h)
Climb to 16,400 ft. (5 000 m)	8 min.
Ceiling	30,500 ft. (9 300 m)

AMERICAN MONOCOUPÉ RANGE

Economical two-seater cabin monoplanes—one of which, in a modified form, took part in the England-Australia Race

WELL known in the United States as private owners' "Utility" types, the aircraft manufactured by the Monocoupe Corporation, of Lambert Field, Robertson, Mo., are high-wing monoplanes with side-by-side seating.

Four models are produced, the Monocoupe "90" (Lambert R.266), which is produced as a landplane or seaplane, the De Luxe Model "90" using the same engine, the D.145 (Warner "Super-Scarab"), and the model 125 (Warner "Scarab").

Structurally, all the machines are similar, being braced high-wing monoplanes with wooden wings and welded steel fuselage. Two solid spruce spars routed to "I" section with wire drag bracing, solid compression ribs and aluminium sheet leading edge, are employed for the wings.

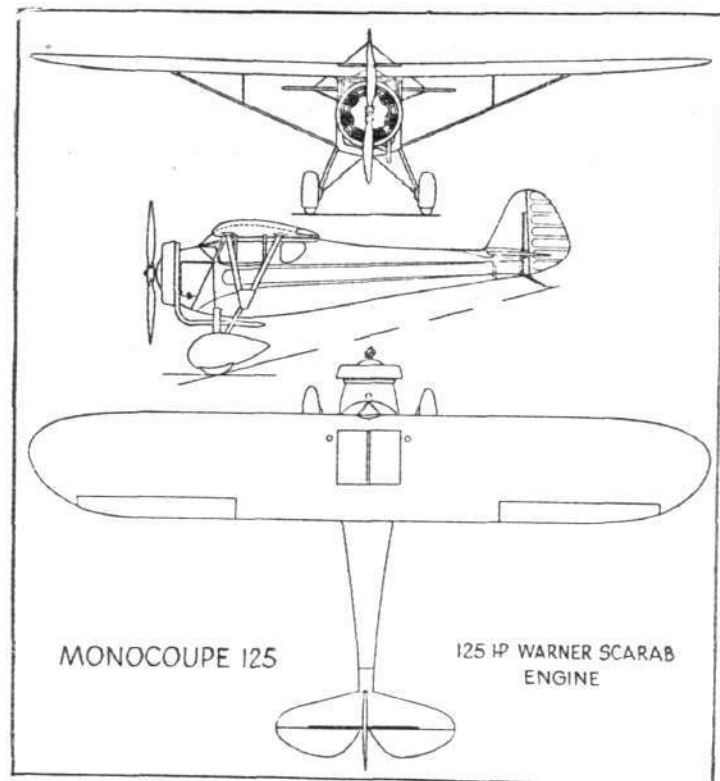
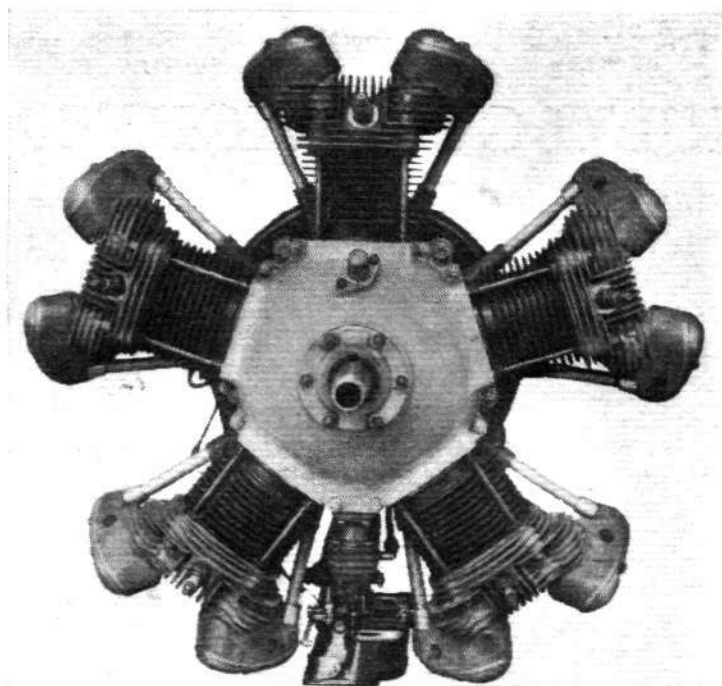
The Monocoupe "90" and De Luxe model "90" are equipped with trailing edge flaps. It is claimed that the De Luxe model "90" with flaps will take off in ten seconds in 328 ft. The landing run with full load without flaps or brakes is given as 400 ft., or 100 ft. with flaps and brakes.

Pilot and passenger are seated side by side in a cabin beneath the wing. The machine may be flown from either seat, the starboard set of controls being quickly removable.

Working parts of the control system are easily inspected by dropping a large metal cowling on the underside of the fuselage. The undercarriage is an exceptionally neat split wire braced type, using medium-pressure air wheels and brakes.

Lambert R.266 Engine

The Lambert R.266 5-cylinder radial engine of 90 h.p. is used in the De Luxe model "90" with a specially developed "tunnel" type cowling. This engine is produced by the Lambert Engine and Machine Co., and is notable for its clean design, due to the grouping of the manifolds and valve gear behind the cylinders. The bore is 4.25 in., stroke 3.75 in., and the unit gives 85 h.p. at 2,250 r.p.m. and 90 h.p. at 2,375 r.p.m. The two-piece magnesium alloy crank case is split on a plane through the cylinder centres. Cylinder barrels are of



A Light American Radial: The Lambert R.266 engine gives 90 h.p. at 2,375 r.p.m.

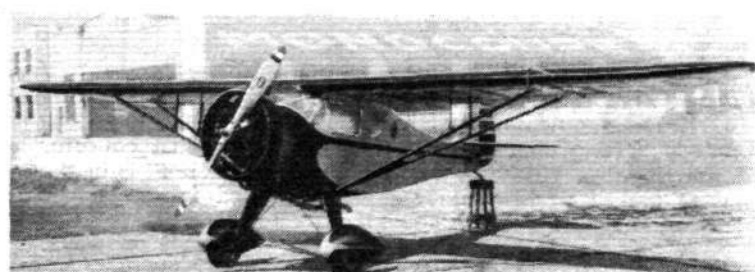
high-strength nickel iron The heat-treated chrome-nickel steel crankshaft is of the two-piece single-throw type, carried on three ball bearings, and the lubrication system is of the pressure dry-sump type. Without equipment the engine weighs 214 lb.

A batch of Model D.145 Monocoupes, with special equipment, has been supplied to the Aeronautics Branch of the United States Department of Commerce. This version is fitted with the Warner "Super Scarab" engine of 145 h.p., which gives the machine a top speed of 160 m.p.h. and a cruising speed of 145 m.p.h. The rate of climb at sea-level is 1,500 ft./min. and the service ceiling 18,000 ft./min.

"Cleaned up" Monocoupes have repeatedly distinguished themselves in races in the hands of Mr. John Wright, who, in company with Mr. John Polando, flew one of these machines in the MacRobertson England-Australia race.

MONOCOUPÉ DE LUXE MODEL "90"
Lambert R.266—90 h.p.

DIMENSIONS	
Span	32 ft. (9.76 m)
Length	20 ft. 6 in. (6.3 m)
Height	6 ft. 11 in. (2.1 m)
Wing area	132.3 sq. ft. (12.28 m ²)
WEIGHTS	
Wing loading	11.9 lb./sq. ft. (58 kg/m ²)
Power loading	17.6 lb./h.p. (7.9 kg/h.p.)
Weight empty	935 lb. (567 kg)
Gross weight	1,585 lb. (720 kg)
PERFORMANCE	
Maximum speed	140 m.p.h. (224 km/h)
Cruising speed	120 m.p.h. (193 km/h)
Landing speed	40 m.p.h. (65 km/h)
Climb at sea level	900 ft./min. (4.58 m/sec)
Service ceiling	15,000 ft. (4,575 m)



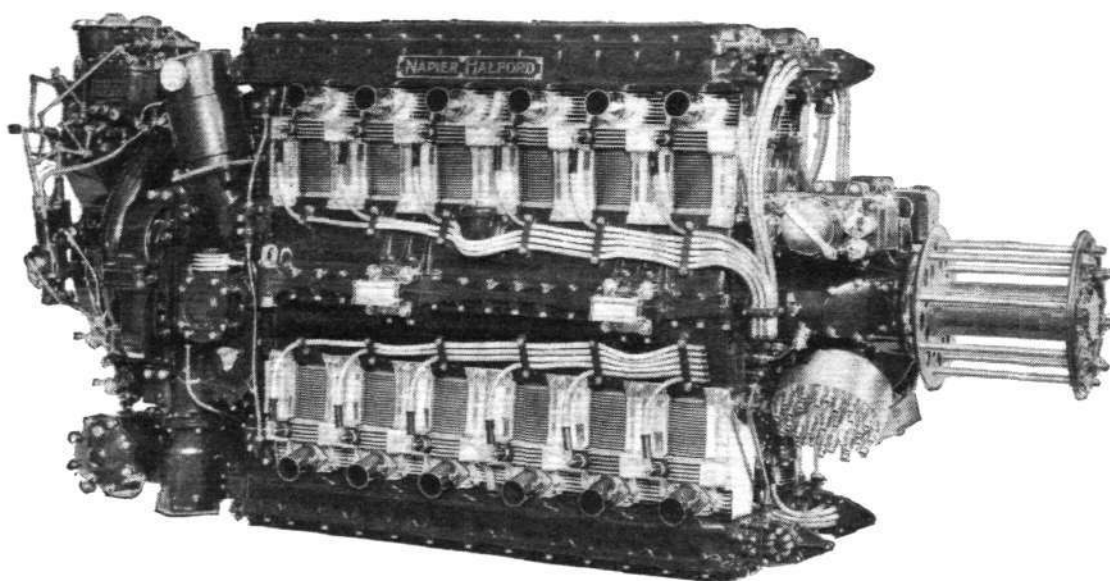
Monocoupes: (Top) Models D.145 and 125, and (bottom) the De Luxe Model 90, one view showing the trailing edge flaps which give a landing speed of 40 m.p.h.

A NEW DUTCH FIGHTER

THE FOKKER COMPANY has designed a single-seater fighter, known as the D.XIX, which, when fitted with a Rolls-Royce "Kestrel" IV of 600 h.p., is expected to have a maximum speed of 251 m.p.h. It is a biplane with typical Fokker tapered wings, with "cut-outs" in the trailing edge of each. The pilot's cockpit is completely enclosed and embodies a sliding roof. Armament consists of one 0.5 calibre

gun in the fuselage, synchronised to fire through the airscrew arc, and two rifle-calibre guns in the top wings. Such modern refinements as "kidney"-type exhausts, "tabs" inset into the trailing edge of the elevator, flaps on the lower wing, and a swivelling tail wheel are incorporated in the design. The Hispano Suiza Xbrs engine of 650 h.p. is an alternative power plant. Both types are cooled by ethylene glycol.

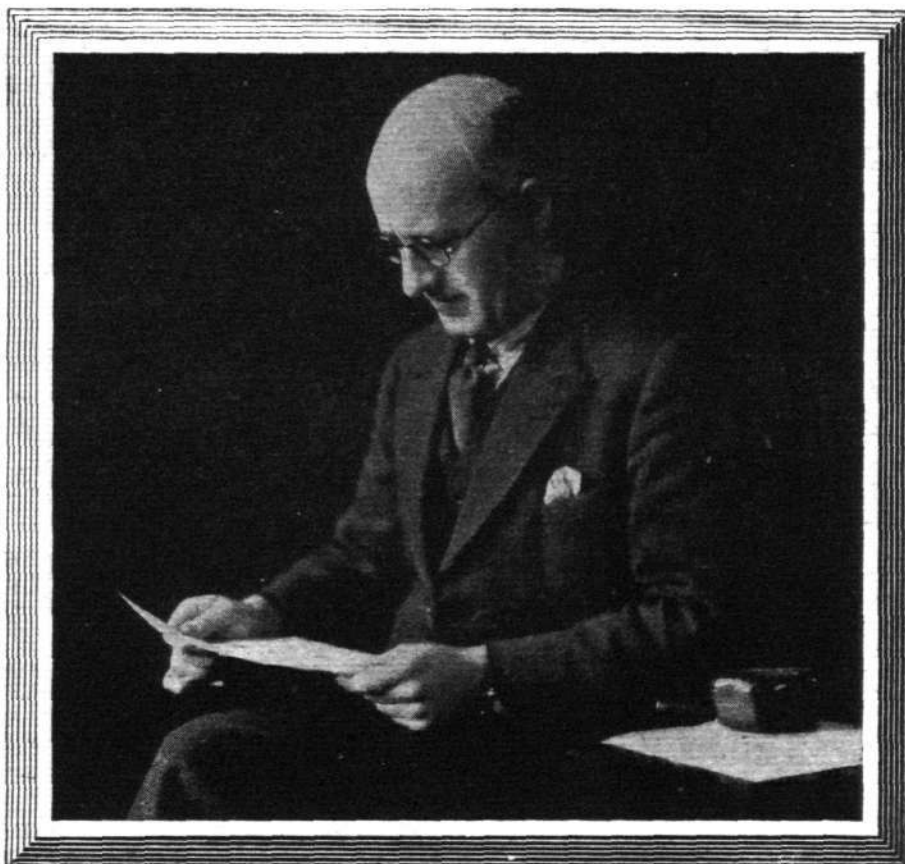
Dagger



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AMERICA'S LATEST "CLIPPER"

The New Martin Trans-oceanic Flying Boat : Accommodation for Fifty Passengers : Mail Range of 4,000 miles



On its first test flight the "Clipper" left the water in twelve seconds, flying "light."

A MAXIMUM range of about 4,000 miles is calculated for the new "Clipper" flying boat launched recently by the Glenn Martin Company for Pan American Airways. This figure is for mail-carrying purposes. When the craft is used as a carrier of both mails and passengers the range is estimated at 3,000 miles. The estimated maximum speed is about 180 m.p.h. and the cruising speed 160 m.p.h. At 75 per cent. of the available power the duration should be slightly over 20 hours, and at that power the calculated speed is 145 m.p.h.

The general arrangement drawings, for which we are indebted to our American contemporary, *Aero Digest*, show the shape of hull and wings, and it will be seen that a slight "gull's wing" shape has been given to the centre-section.

For ordinary ranges the machine can be equipped with passenger accommodation for fifty, but at present the cabin layout is being arranged for eighteen, with settees so designed that they can be converted into berths. This arrangement has been chosen with the trans-Pacific service in view. By carrying the engine exhaust pipes back over the top of the wing, and by suitably lagging the walls of the cabins, the noise level has been reduced to 72 decibels, which is approximately equivalent to the noise in a Pullman carriage on a straight and fairly good track.

The First Test

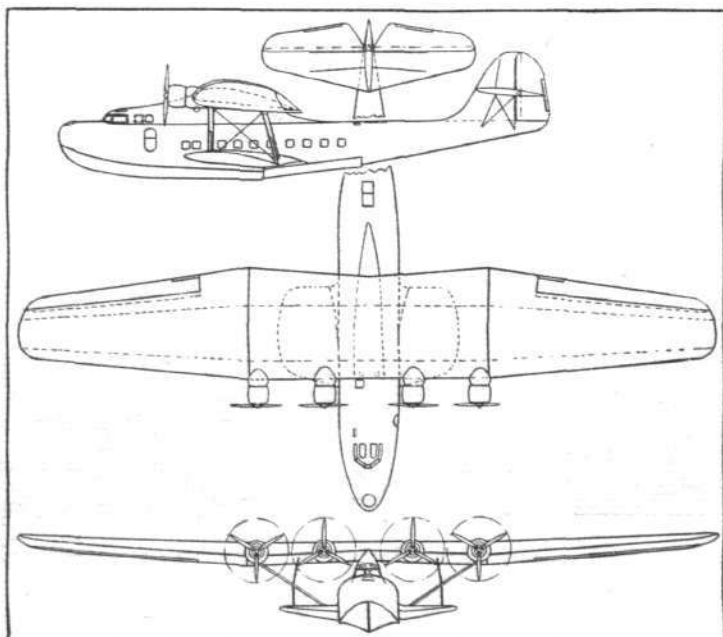
On the first test flight, carried out by Mr. W. K. Ebel, the Martin company's test pilot and assistant chief engineer, the machine left the water in twelve seconds.

Interesting features of the Martin "Clipper" are the use of sponsons for maintaining lateral stability on the water, and the stowage of the fuel (4,000 American gallons) in the hull. In this country it has for many years been the practice to put the fuel tanks in the wings, well away from the hull, so as to reduce fire risk. In the Martin the lower portion of the hull itself forms the petrol tanks, and it is probable that a considerable amount of weight has thereby been saved. It will be remembered that in the giant Dornier "Do. X" twelve-engined flying boat the tanks were also housed in the lower part of the hull. During the discussion on Dr. Dornier's lecture at the Royal Aeronautical Society several speakers expressed doubts as to the wisdom of this placing of large quantities of petrol. Presumably the Martin engineers have decided that the fire risk is smaller in practice than might be expected. There is certainly something to be said for the arrangement from the aircraft designer's point of view, for not only does he save most of the weight of the fuel tanks, but he lowers the centre of gravity of the boat a great deal when the tanks are full. This is of importance when sponsons are used for lateral stability.

If the figures published are to be believed, the Martin engineer must have saved a very great deal of structure weight, not only in this manner, but in many others, as the empty weight of the machine is given as 23,100 lb., while the gross weight is 51,000 lb. This would give a ratio of gross weight to tare weight of 2.205. In other words, the machine carries as disposable load approximately *one and one-fifth times its own weight*. If the figures are correct they show very great skill on the part of the designers. An average value is 65 per cent.

Power is supplied by four fourteen-cylinder Pratt and Whitney "Twin Wasp" engines of 800 h.p. each. The engines are located slightly forward of the leading edge of the wing, carried in streamline nacelles, and enclosed in long N.A.C.A. cowls. As already mentioned, most of the fuel is carried in the lower part of the hull, but a certain amount is carried in the sponsons. Engine-driven pumps transfer the petrol to service tanks in the wing. Three-bladed Hamilton Standard controllable-pitch airscrews are fitted.

The span of the monoplane wing is 130 ft., and the total wing area is 2,315 sq. ft., of which the sponsons account for 145 sq. ft. The overall length is 90 ft. At full gross weight the wing loading is just over 22 lb. per sq. ft., and the power loading 16 lb. per h.p. The machine has been designed to fly at 6,000 ft. with full load on any three of its four engines.



THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

Ellsworth Flight Postponed

Unfavourable weather conditions have forced the Ellsworth-Wilkins expedition to abandon its idea of a trans-Antarctic flight this season.

Those Pacific Aerodromes

Only one square mile in area, Wake Island, in the Pacific, has been transferred to the control of the U.S. Navy "for administrative purposes." It is rumoured that the island is to be used during the spring as a base for experimental trans-Pacific flights.

A New U.S. Airship

According to a report from Washington, President Roosevelt has approved the construction by the Government, at a cost of £1,000,000, of an airship which will be larger than the new Zeppelin now under construction at Friedrichshafen for Atlantic air services. This will lead to the formation of a private company which will co-operate with the German Zeppelin group.

Mr. Kenneth Waller Honoured

Last week Mr. Kenneth Waller flew to Brussels to receive the Order of the Lion of Africa which King Leopold has conferred on him in recognition of his high-speed flight from Belgium to the Congo and back. On January 17 Mr. Waller and M. Franchomme were received by the King, who had a long conversation with them.



"BON VOYAGE": Air Vice-Marshal A. M. Longmore, C.B., D.S.O., Air Officer Commanding Coastal Area, wishing members of 210 (F.B.) Squadron a good voyage on their departure from Pembroke Dock for Singapore. No. 210 (F.B.) Squadron, commanded by Sqn. Ldr. A. F. Lang, is taking four "Singapore III" flying boats out to Singapore to re-equip No. 205 (F.B.) Squadron. They reached Berre (Marseilles) on January 16. (*Flight* Photograph.)

Twenty-five Years Ago From "Flight" of January 22, 1910.

"From Berlin comes the news that Herr Gustavus Lilienthal, a brother of the famous pioneer in flying matters, has just discovered a method by which a monoplane can be propelled by muscular action just as easily as an ordinary bicycle. Although no details of the invention have yet been divulged, it is said to have deeply impressed a number of aviators who have seen it."

Scott to Lecture

C. W. A. Scott will lecture on his victorious England-Melbourne flight at Queen's Hall, at 3 p.m., on Tuesday, February 7. The Duke of York will attend, Lord Wakefield will preside, and Lord Londonderry and Air Chief Marshal Sir Robert Brooke-Popham have also accepted invitations.

A Real "Air-car"

A vehicle which is a combination of an aeroplane and a motor car has been built and used, both in the air and on the ground, by Professor John Miller, of the University of Washington. Engine power may be transmitted either to an airscrew or to the wheels.

Re-victualling by Air

At considerable risk, owing to the very bad weather, Lt. Col. Ribeiro da Fonseca, of the Portuguese Military Air Force, recently flew from Amadora (Lisbon) to the Burlongs, off the coast of Portugal, in a Junkers W.35L, to drop provisions to the lighthouse staff, which was in danger of starving. Very bad weather and high seas had prevented the usual boat from approaching the island.

Air Raid Relic Sold

A large German bomb, found in the Thames, and which was dropped during a daylight raid on July 7, 1917, has been sold for £2 10s.

The Autogiro in Germany

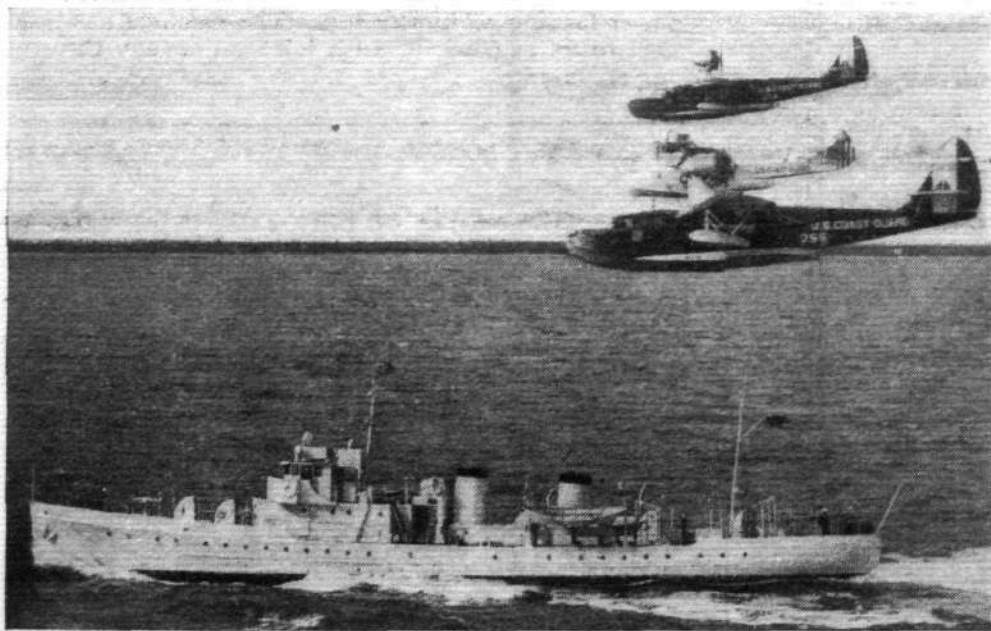
Piloted by Mr. Marsh, a type C.30 Autogiro was demonstrated in the presence of German public officials and Press representatives at the Tempelhof Aerodrome on January 16.

For Missionary Service

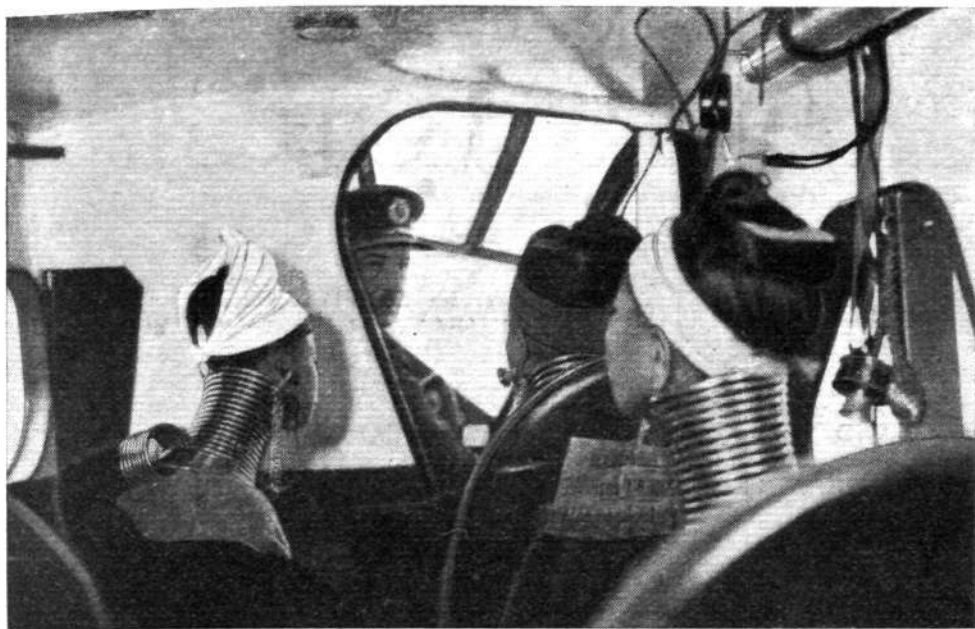
Cardinal Archbishop Schulte will bless, in Cologne, two Junkers aeroplanes, *St. Peter* and *St. Paul*, which have been constructed for missionary service, the former in South Africa and the latter in New Guinea.

A Moscow-Arctic Flight

A flight from Moscow to Vaigach Island, near Novaya Zemlya in the Arctic, the first undertaken under polar night conditions, is planned to take place soon. In an R-5 machine pilot Farikh and mechanic Chagin hope to cover the 1,865 miles in 17 flying hours over a period of three days. The aircraft will carry two engineers and hydrogeologists to investigate the sources of water in the ore mine at Vaigach and possible means for its elimination. The cabin will be heated, and such equipment as sleeping bags, skis, fur-lined boots, a portable hut, and photographic apparatus will be provided. Fuel for a non-stop flight of 12 hours will be carried.



NOT THE "MAYO-SHORT" COMPOSITE AIRCRAFT, but three Miami Coast Guard machines—the *Arcturus*, *Acanar* and *Sirius*—saluting the U.S. patrol boat *Pandora*. The two larger machines are G.A. F-15 flying boats, while the third is a Douglas "Dolphin" amphibian.



AN ALTITUDE RECORD? These three much-photographed ladies from Bermuda—who are appearing at Bertram Mills' Circus at Olympia—made their first flight last Sunday, in a Hillman "Dragon."

Gyroplanes in the North

It is possible that, should the experiments now in progress with the Gyroplane invented by Mr. David Kay—reference to which has already been made in *Flight*—prove successful, a factory for their manufacture may be established in Perth. It is reported that negotiations are proceeding between the Perth Town Council and Mr. Kay with this end in view. The Air Ministry have shown interest in the machine.

American Items

According to the U.S. Department of Commerce, 775 American civil aircraft have wireless equipment. Of this number only 326 sets are of the "two-way" pattern.

The Cunningham-Hall Aircraft Corp. of Rochester, New York, which entered a machine for the Guggenheim Safe Aircraft Competition, has produced a new two-seater low-wing monoplane with a special high-lift wing and a unique lateral control system.

Flying a new Grumman amphibian, with Wright "Cyclone" engine, Lt. Cdr. E. F. Stone, of the U.S. Coast Guard, averaged 191.796 m.p.h. over a course at Chesapeake Bay. The former record for this class of machine was 177 m.p.h.

A Douglas Flies High

Although the makers claim for the D.C.2 a ceiling of 25,400 feet, one of these machines, belonging to Pan-American Airways, and, doubtless, flying at less than its maximum weight, has reached 29,800 feet over Lima, Peru. Prof. Serge Korff, of the Californian Institute of Technology, was on board, and made a study of cosmic rays, and some useful data was obtained.



A JAPANESE FLEET FIGHTER: The Nakajima type 90 shipboard fighter, fitted with a 450 h.p. Nakajima "Jupiter."

A Latécoère Conversion

The big four-engined Latécoère 550 seaplane described in *Flight* of February 1, 1934, has recently been converted into a landplane. There are two pairs of landing wheels.

Lorraine "Petrel" in "Fury"

A 720 h.p. Lorraine "Petrel" twelve-cylinder liquid-cooled engine has been installed in a Hawker "Fury" single-seater fighter belonging to Yugoslavia.

A Foolproof Machine

A British designer is, according to Dame Rumour, hard at work preparing the plans for the construction of an aeroplane embodying features of a motor car (such as foot accelerator and brakes) and "robot" controls—in other words, a foolproof machine. His main idea is to simplify flying and to enable thousands to learn to handle aeroplanes with absolute safety after a few hours of instruction. Well, there is certainly a market for such a machine!

Speed Record Broken?

According to an unconfirmed report from America, the American pilot Chester has broken the world's speed record for machines under 450 kg over a course of 100 km, which was established by the French pilot Delmotte last May, with a speed of 214.66 m.p.h. (345.622 km/h). Chester, flying a machine of his own construction at Miami, is said to have covered the 100 km at a speed of 237 m.p.h. (381.460 km/h). Details of his machine are not available, but it is understood that it is the "Chester Special" he has flown at the Cleveland Races.

Diary of Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in this list.

- Jan. 29. Newcastle-on-Tyne Aero Club Annual Dinner and Dance, Barras Bridge Assembly Rooms, Newcastle-on-Tyne.
- Feb. 4. Jubilee Celebration of the Foundation of the City and Guilds College, Imperial College of Science and Technology.
- Feb. 7. "The England-Australia Air Race." Lecture by Mr. C. W. A. Scott, at the Queen's Hall, London.
- Feb. 8. "Ice Formation in Carouretiers." R.Ae.S. Lecture by Mr. L. P. Coombes.
- Feb. 15. Annual Aviation Ball, Bristol and Wessex Aeroplane Club, Grand Spar Hotel, Clifton.
- Mar. 1. Annual Dance, Leicestershire Aero Club, Palais de Danse, Leicester.
- Mar. 1. "Fuels for Aircraft Engines." R.Ae.S. Lecture by Mr. E. L. Bass.

- Mar. 5. "Problems of Cold Presswork." Joint R.Ae.S. and Inst. A.E. Lecture by Dr. H. Gough and Dr. Desch.
- Mar. 15. "New Developments of the Autogiro." R.Ae.S. Lecture by Senor Juan de la Cierva.
- Mar. 29. "Piloting Commercial Aircraft." R.Ae.S. Lecture by Sqn Ldr. H. G. Brackley.
- Mar. 29. Annual Dinner, Norfolk and Norwich Aero Club, Mousehold Aerodrome.
- Apr. 12. "Commercial Aircraft." R.Ae.S. Lecture by Capt. G. de Havilland.
- May (Date not yet fixed). Wilbur Wright Lecture, R.Ae.S., by Mr. W. D. Douglas.
- June 1. Brooklands "At Home."

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS



AIR MINISTRY ANNOUNCEMENTS

CHANGE IN THE HIGHER COMMAND

Air Commodore Alfred William Iredell, M.R.C.S., L.R.C.P., K.H.P., now Principal Medical Officer at R.A.F. Headquarters, Inland Area, to be Director of R.A.F. Medical Services at the Air Ministry, on March 1, 1935, vice Air Vice-Marshal John McIntyre, C.B., M.C., M.B., B.Ch., K.H.S., who retires from the R.A.F. on that date.

Air Comdre. Iredell was commissioned in the Royal Navy, as a surgeon, in 1903, and attained the rank of Surgeon Commander in 1917. He served throughout the Great War, 1914-1918. He transferred to the Royal Air Force in 1918 and in the following year was granted a permanent commission as Wing Cdr. He became Group Capt. in 1926 and Air Comdre. on January 1, 1934. From 1921 to 1926 he acted as Deputy Director of R.A.F. Medical Services and since March, 1932, has filled the post of Principal Medical Officer at R.A.F. Headquarters, Inland Area. He was appointed Honorary Physician to the King on February 14, 1934.

RE-EQUIPMENT OF UNITS

The following re-equipment of R.A.F. Units has recently taken place:—

No. 10 Squadron	" Heyford "	replaced " Virginia "
" 84 "	" Vincent "	" " Wapiti "
" 605 "	" Hart "	" " Wapiti "
" 811 "	" Baffin "	" " Ripon "
" 823 "	" Seal "	" " IIF F.A.A. "
" 824 "	" Seal "	" " IIF F.A.A. "

The following Units are expected to complete or commence re-equipment during the next few months:—

No. 7 Squadron	" Heyford "	replacing " Virginia "
" 8 "	" *Vincent "	" " IIF G.P. "
" 19 "	" Gauntlet "	" " Bulldog IIA. "
" 24 "	" Hart "	" " Osprey "
" 30 "	" *Hardy "	" " Wapiti "
" 36 "	" Vildebeest "	" " Horsley T.B. "
" 202 "	" Scapa "	" " IIF F.A.A. "
" 205 "	" Singapore "	" " Southampton "
" 604 "	" * 3 Hart "	" " Wapiti "
" 820 "	" Shark "	" " Seal "
No. 1 Coast Defence Training Flight	" Osprey "	" " IIF F.A.A. "

* Re-equipment of these Units has already commenced.

INCREASING THE RESERVE

With reference to the Air Ministry announcement on this page inviting applications for the post of sergeant pilot in the R.A.F. Reserve, it may be stated that the immediate requirements are 200 more pilots. A scheme is also under consideration for increasing the number of Reserve training schools.

SPECIALIST TORPEDO COURSE

The undermentioned officers, having successfully completed the torpedo course which terminated on November 30, 1934, following the specialist E course at Henlow, are granted the symbol E (T):—
Flt. Lts. F. J. St. G. Braithwaite and P. G. Thomson.

NEW AERODROME SITES

Three more sites for new R.A.F. aerodromes have now been selected, namely, Stradishall, in Suffolk, almost due south of Mildenhall; Ternhill, three miles S.W. of Market Drayton, in Shropshire; and Harwell, two miles west of Didcot.

WEST AFRICAN FLIGHT

The return journey of No. 8 (Bomber) Squadron, which is flying from Aden to Freetown, in Sierra Leone, should be as follows:—January 27, to Bamako; January 28, Segou; January 29, Niamey; January 30, Sokoto; January 31, Maidugari; February 3, Fort Lamy; February 4, El Fasher; February 5, Khartoum; February 8, Port Sudan; February 9, Massawa; and February 10, Perim and Aden.

R.A.F. STAFF COLLEGE

The following officers have satisfactorily completed the twelfth course (1934) at the R.A.F. Staff College and are entitled to the letters " p.s.a. " after their names in the Air Force Lists of their respective services:—

ROYAL AIR FORCE

Sqn. Ldrs. C. A. Stevens, M.C., H. I. T. Beardsworth, and O. E. Carter, A.F.C. Flt. Lts. E. J. L. Hope, A.F.C., R. Pyne, D.F.C., J. W. F. Merer, R. Jones, A. H. H. MacDonald, G. R. C. Spencer, J. B. H. Rogers, I. E. Brodie, R. N. Waite, G. Combe, P. J. R. King, W. L. Dawson, C. E. N. Guest, E. B. Addison, R. O. Jones, O. B. Swain, S. H. V. Harris, R. G. Hart, and G. L. Worthington (Stores).

DOMINION AIR FORCES

Royal Australian Air Force

Sqn. Ldr. J. E. Hewitt and Flt. Lt. J. Waters.

Royal Canadian Air Force

Flt. Lts. B. F. Johnson and E. E. Middleton.

The following officers of the Royal Navy, the Army, and the Indian Army have satisfactorily completed the twelfth course (1934) at the R.A.F. Staff College:—

ROYAL NAVY

Cdrs. A. E. M. Cunninghame Graham, R.N., p.s.c., and T. M. Smith, R.N., p.s.c.

ARMY

Major E. J. Medley, M.C., R.A., p.s.c.

INDIAN ARMY

Capt. J. R. Reynolds, p.s.c.

IMPERIAL DEFENCE COLLEGE

The following officers have completed satisfactorily a course at the Imperial Defence College which terminated on December 14, 1934:—Group Capt. J. S. T. Bradley, O.B.E., Group Capt. T. L. Leigh-Mallory, D.S.O., p.s.a., Wing Cdr. A. W. F. Glenny, M.C., D.F.C., p.s.a., Sqn. Ldr. A. P. M. Sanders, p.s.a., and Sqn. Ldr. O. R. Gayford, D.F.C., A.F.C., p.s.a.

R.A.F. FLYING ACCIDENTS

The Air Ministry regrets to announce that No. 346833 Sergeant Francis Hubert Land, the pilot of the aircraft, and No. 364430 Sergeant Clifford Leonard Oliver Barker lost their lives in an accident which occurred at Tusmore Park, on January 19, to a Moth aircraft of the Station Flight, Upper Heyford.

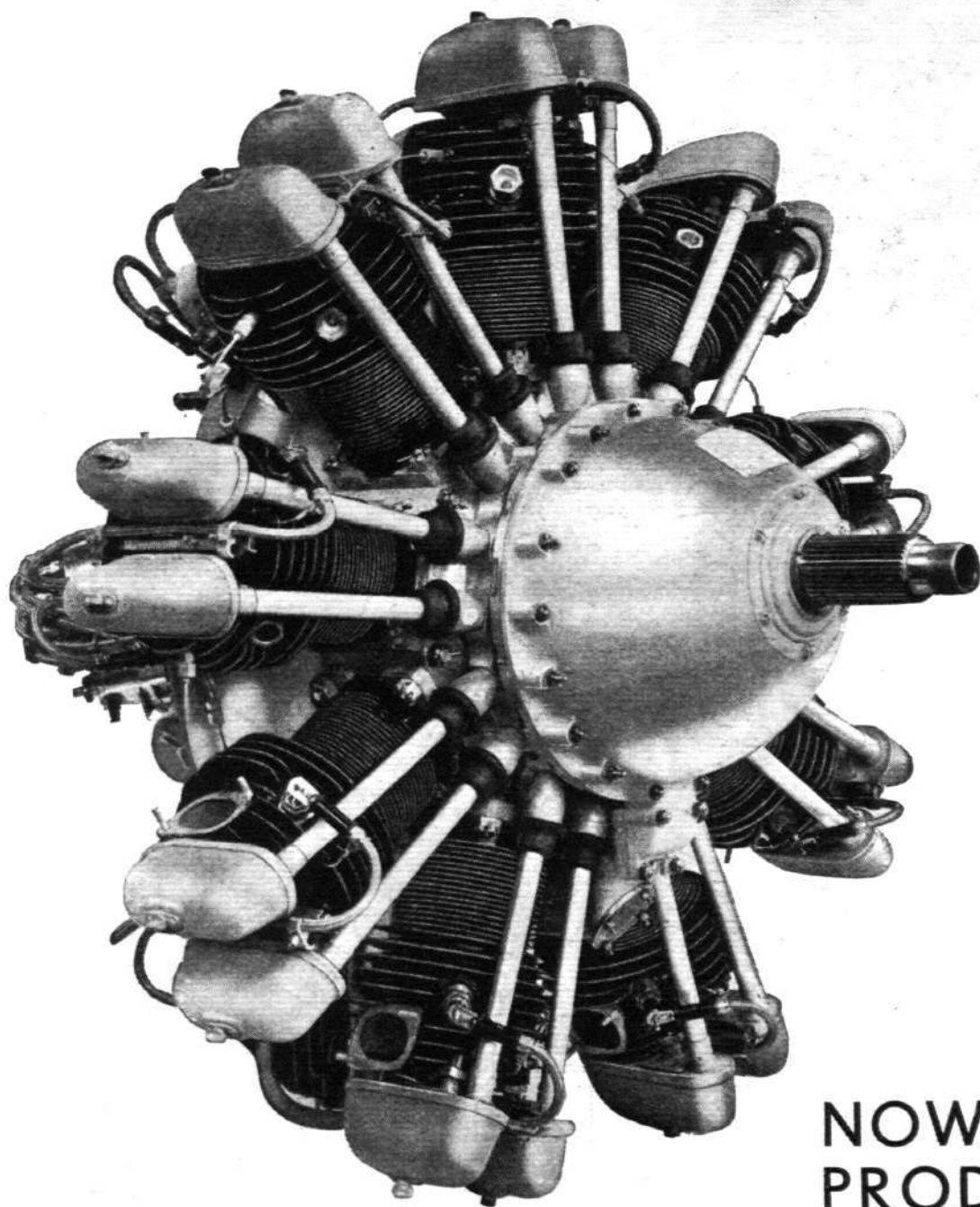
Also that Flying Officer Lewis Walter Oliver, of No. 2 (Army Co-operation) Squadron, Manston, lost his life in an accident which occurred at Stratford-Sub-Castle, near Old Sarum, on January 21, 1935, to a " Rota " aircraft of the School of Army Co-operation, Old Sarum. F/O. Oliver was the pilot and sole occupant of the aircraft.

ROYAL AIR FORCE RESERVE (PILOTS)

The Air Ministry announces:—

A large number of vacancies exist for entry into the Royal Air Force Reserve during the next few months for initial training in flying. The vacancies will be filled by direct entrants from civil life. Experience of flying is not necessary as a complete course of flying instruction is given at no cost to the candidate. Applicants must not have reached their twenty-fifth birthday and must be physically fit and of good education. The initial period of service in the Reserve is five years. The preliminary instructional course consists of fifty hours' flying which must be carried out in a maximum period of three months. With good weather, candidates should, however, be able to complete the course in about two months. Within certain limits, the course may be broken and flying instruction carried out at times convenient to candidates. Entrants are required to do ten hours' flying in the second half of their first year of service. Thereafter they must carry out twenty hours' flying annually within a maximum period of twenty days. Entrants may also be required to attend a short four to six day course at a R.A.F. unit in their second and subsequent years of service.

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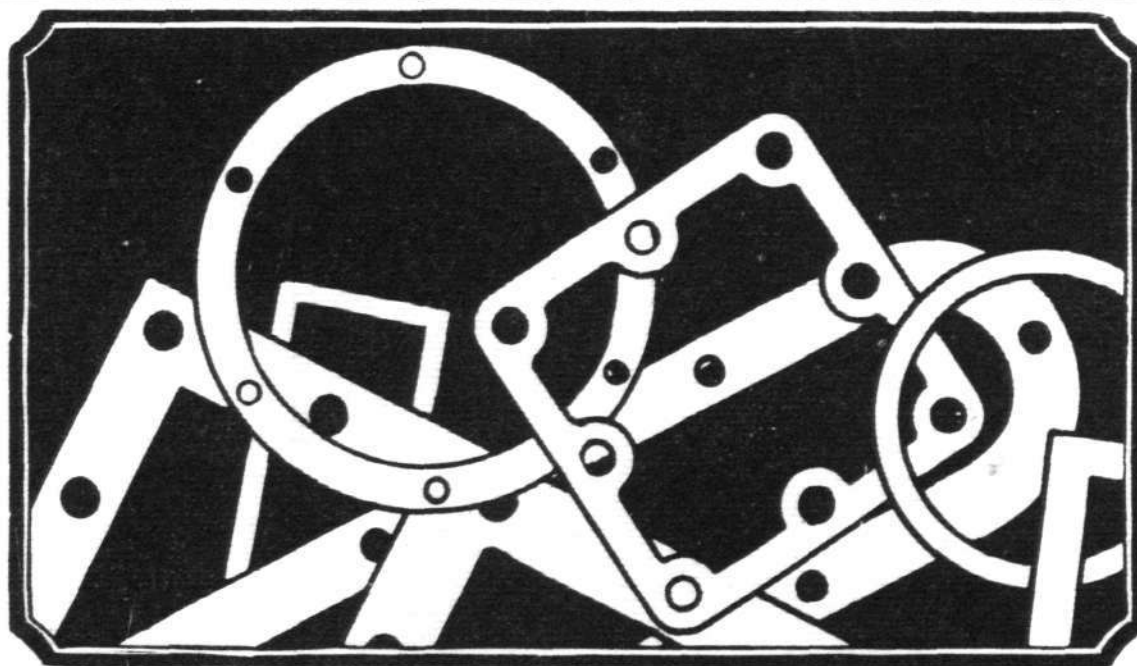
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Vacancies also exist for holders of Civil Pilots licences. Candidates may be considered in this category up to their twenty-eighth birthday and are required to pass a flying test to demonstrate their ability as pilots. On passing this test they are not required to attend a course of preliminary instruction but to proceed direct to the annual training referred to in the preceding paragraph.

Flying training is carried out at civilian flying schools, at present situated at Bristol, Brough (East Yorks), Hamble (Hants), and Hatfield (Herts). The instruction is given by qualified flying instructors of the R.A.F. Reserve and the types of aircraft used are the de Havilland "Tiger Moth," "Avro," "Cadet," and Blackburn "B.2." The syllabus of instruction includes practice in air pilotage,

aerobatics, "blind flying," camera gun work and photography. The pay and allowances of airman pilots during training amount to 16s. 6d. a day until qualified as a pilot and thereafter to 17s. 6d. a day. When so qualified they also receive reserve pay and flying reserve pay amounting to approximately £23 10s. per year. Candidates selected for interview may be required to attend a selection board and to pass a medical examination in London prior to acceptance. Copies of A.M. Pamphlet 56, which contains full particulars as to the method of entry into the Reserve and conditions of service, together with the necessary application forms, can be obtained from the Secretary, Air Ministry (S.7 (c)), Adastral House, Kingsway, London, W.C.2, on request.

ROYAL AIR FORCE GAZETTE

London Gazette, January 15, 1935

General Duties Branch

Air Vice-Marshal C. L. N. Newall, C.B., C.M.G., C.B.E., A.M., is appointed a Member of the Air Council (Jan. 14); Air Comdre. A. S. Barratt, C.M.G., M.C., is appointed Director of Staff Duties, Air Ministry, vice Air Comdre. C. L. Courtney, C.B., C.B.E., D.S.O. (Jan. 12); Group Capt. J. S. T. Bradley, O.B.E., is appointed Director of Equipment, Air Ministry, vice Air Comdre. A. W. Bigsworth, C.M.G., D.S.O., A.F.C. (Jan. 14).

The following are granted permanent commissions as Pilot Officers with effect from Dec. 31, 1934:—W. G. Bannister, W. F. Beckwith, G. H. Foss, P. B. B. Ogilvie.

Capt. I. O'B. MacGregor (Royal Artillery) is granted a temporary commission as Flying Officer (Honorary Flt. Lt.) on being re-seconded for duty with the R.A.F. with effect from Oct. 1, 1934, and with seny. of Oct. 1, 1930 (substituted for the notification in the *Gazette* of Oct. 23, 1934); Lt. C. C. Musselwhite (Middlesex Regt.) is granted a temporary commission as Flying Officer on being re-seconded for duty with the R.A.F. with effect from Oct. 1, 1934, and with seny. of Oct. 1, 1930 (substituted for the notification in the *Gazette* of Oct. 23, 1934); Lt. Comdr. G. Willoughby, R.N., is re-attached to the R.A.F. as a Flight Lieutenant with effect from Dec. 31, 1934, and with seny. of Jan. 1, 1933; Group Capt. I. G. V. Fowler, A.F.C., is placed on the half-pay list, Scale A (Jan. 12); Wing Com. R. G. Gardner, D.S.C., is placed on the half-pay list, Scale A, from Jan. 5 to 13 inclusive.

Stores Branch

The following are granted permanent commissions as Pilot Officers on probation with effect from and with seny. of Jan. 4:—S. G. Walker, H. Stones, H. M. C. Harwood, L. C. Dennis, A. L. Britton. Flt. Lt. G. L. Worthington is placed on the half-pay list, Scale A, from Jan. 4 to 17 inclusive.

Accountant Branch

F/O. E. L. G. Le Dieu is promoted to the rank of Flight Lieutenant (Dec. 3, 1934).

Medical Branch

Flt. Lt. F. L. White, M.R.C.S., L.R.C.P., is promoted to the rank of Squadron Leader (Jan. 16).

Dental Branch

Flt. Lt. M. J. Pigott, B.D.S., is granted a permanent commission in this rank (Jan. 16).

Miscellaneous

Lt. E. O. Wanliss (East Lancashire Regt.) is granted a temporary commission as Flying Officer with effect from Dec. 1, 1934, and

with seny. of Dec. 1, 1930, on acceptance of Reserve liability in the R.A.F.

Commissioned Engineer Officer

Flying Officer on probation D. H. Newton, M.B.E., is confirmed in rank (Sept. 11, 1934).

Erratum

In the *Gazette* of Jan. 4, for G. E. F. Procter read G. E. F. Proctor.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

The following Pilot Officers on probation are confirmed in rank:—R. W. Gautrey, G. G. McLannahan (Dec. 5, 1934); R. Bennett (Dec. 6, 1934); J. N. Addinsell, Fitz-E. J. Evered (Dec. 8, 1934); J. J. G. Simper, B. Walker (Dec. 9, 1934); J. W. S. Forbes (Dec. 21, 1934).

F/O. R. A. C. Brie is transferred from Class A to Class C (Sept. 12, 1934); Pilot Officer on probation B. H. Boon is transferred from Class AA (ii) to Class C (Jan. 14).

The following Flying Officers relinquish their commissions on completion of service:—C. McL. Reid (Nov. 1, 1934); M. A. Cowan (Jan. 5).

F/O. E. A. Clear, M.C., relinquishes his commission on account of ill-health and is permitted to retain his rank (Jan. 16); the notification in the *Gazette* of July 31, 1934, concerning P/O. C. Bland is cancelled; the notification in the *Gazette* of Oct. 9, 1934, concerning F/O. R. A. C. Brie is cancelled.

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—P/O. P. K. Devitt is promoted to the rank of Flying Officer (Jan. 13).

No. 601 (COUNTY OF LONDON) (FIGHTER) SQUADRON.—Sqn. Ldr. H. N. St. V. Norman (Lt., Royal Corps of Signals, R.A.R.O.) resigns his commission (Dec. 1, 1934); Flt. Lt. R. G. Shaw, D.F.C., is promoted to the rank of Squadron Leader and appointed to command of the Squadron (Dec. 1, 1934).

TERRITORIAL ARMY

ROYAL ENGINEERS.

Anti-Aircraft Searchlight Companies

KENT AND MIDDLESEX GROUP.—Hon. Sec. Lt. G. B. Holmes, late R.A.F., to be Sec. Lt. (Jan. 1).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron Leaders.—F. C. B. Savile, to No. 821 (F.S.R.) Squadron, Upavon, 4.1.35; J. A. Gray, D.F.C., to Royal Air Force College, Cranwell, 8.1.35; for flying duties vice Sqn. Ldr. C. E. V. Porter. P. M. McSwiny, to Headquarters, Inland Area, Stanmore, 14.1.35; for Armament duties vice Sqn. Ldr. A. R. Mackenzie. A. P. M. Sanders, to D.O.I., Dept. of Chief of the Air Staff, Air Ministry, 15.1.35, vice Wing Cdr. Hon. R. A. Cochrane, A.F.C. S. E. Toomer, D.F.C., to D.S.D., Dept. of Chief of the Air Staff, Air Ministry, 12.1.35, vice Sqn. Ldr. J. W. Baker, M.C., D.F.C.

Flight Lieutenants.—P. R. Barwell, to Central Flying School, Wittering, 7.1.35. E. S. Burns, to R.A.F. Base, Leuchars, 7.1.35. R. J. M. de St. Leger, to R.A.F. Base, Gosport, 5.1.35. R. Pyne, D.F.C., to D.S.D., Dept. of Chief of the Air Staff, Air Ministry, 7.1.35. M. V. Ridgeway, to No. 810 (F.T.B.) Squadron, Gosport, 5.1.35. F. J. St. G. Braithwaite, to No. 22 (B) Squadron, Donibristle, 7.1.35. W. L. Dawson, to Headquarters, Palestine and Transjordan, 5.1.35. W. Sanderson, A.F.C., to R.A.F. Depot, Middle East, Aboukir, 20.12.34. L. B. Duggan, to Station Headquarters, Abingdon, 14.1.35.

Flying Officers.—R. H. Page, to No. 10 (B) Squadron, Boscombe Down, 4.1.35. R. C. Mead, to No. 502 (Ulster) (B) Squadron, Aldergrove, 8.1.35. T. A. B. Parselle, to No. 601 (County of London) (F) Squadron, Hendon, 25.11.34.

Pilot Officers.—J. V. C. Badger, to No. 821 (F.S.R.) Squadron,

Upavon, 4.1.35. W. G. Bannister, W. F. Beckwith, G. H. Foss, P. B. Ogilvie, are posted to Supt. of Reserve on 31.12.34, whilst under instruction at a civil flying school on appointment to Permanent Commissions.

The following Pilot Officers are Posted to their respective Units on 15.12.34, on appointment to Permanent Commissions:—L. C. Bicknell, to No. 29 (F) Squadron, North Weald. J. K. L. Carstairs, to No. 3 (F) Squadron, Kenley. H. R. Coventry, to No. 58 (B) Squadron, Worthy Down. H. D. Fraser, to No. 25 (F) Squadron, Hawkinge. D. B. Hatfield, to No. 2 (Army Co-operation) Squadron, Manston. E. M. T. Howell, to No. 142 (B) Squadron, Netheravon. I. C. Jackson, to No. 9 (B) Squadron, Boscombe Down. D. H. Lee, to No. 56 (F) Squadron, North Weald. L. Rose, to No. 9 (B) Squadron, Boscombe Down. D. H. S. Rusher, to No. 23 (F) Squadron, Biggin Hill. H. C. Sawyer, to No. 142 (B) Squadron, Netheravon. F. M. Smith, to No. 33 (B) Squadron, Upper Heyford. J. R. Stephenson, to No. 7 (B) Squadron, Worthy Down. H. C. Vickery, to No. 33 (B) Squadron, Upper Heyford. A. J. Whillier, to No. 58 (B) Squadron, Worthy Down. J. L. Crosbie, to R.A.F. Base, Calshot. E. L. F. Meynell, to R.A.F. Base, Calshot. R. D. A. Wills, to R.A.F. Base, Calshot. B. A. C. Wood, to R.A.F. Base, Calshot. G. J. Wright, to R.A.F. Base, Calshot. D. F. Dixon, to No. 22 (B) Squadron, Donibristle. H. M. Styles, to No. 22 (B) Squadron.

Medical Branch

Flight Lieutenants.—A. Sheehan, to Station Headquarters, Abingdon, 7.1.35. L. Freeman, to Princess Mary's R.A.F. Hospital, Halton, 8.1.35.

PRIVATE FLYING

LORD SEMPILL, A.F.C., F.R.Ae.S.,
DISCUSSES WEATHER CONDITIONS
ENCOUNTERED IN INDIA.

AVIATION in India has many problems common to those in other countries, but some peculiar to itself. Among the latter, weather conditions of a widely varying nature need constant study, and it is fortunate for the future development of flying in that country that India possesses such an efficient meteorological department. Years of research have resulted in an accumulation of information and experience from which aviation has much to gain.

The success of this service owes a great deal to British meteorologists such as Dr. G. C. Simpson, Sir Gilbert Walker and Mr. J. H. Field, who not only carried out a large amount of pioneering investigation themselves, but trained many Indians to carry on their work. With the inclusion of one or two Europeans, the department is now mainly staffed with university-educated Indians, whose published contributions to meteorological science show them to have attained a knowledge of the subject comparable with that of western scientists.

Established long before the advent of civil and commercial aviation, undoubtedly one of the main functions of the Department of Meteorology in the future will be its capacity to aid air transport. Growing facilities throughout the country will therefore be required, both for the acquisition and distribution of meteorological information, and it is satisfactory to note that of the recent vote for civil aviation purposes a substantial sum has been allocated for improved meteorological and radio services. It might have been thought at one time that the forecasting of weather in India was a simple matter, the seasons being of a clearly defined character, but it is now realised that, as far as aviation is concerned, day-to-day forecasts are just as necessary as in western countries.

The Monsoon System

THE weather in India is influenced largely by the monsoon system, the effects of which vary throughout the country. Bounded on the north by the high plateau of Tibet and Central Asia, and with its long coast line on the east and west, the peninsula presents many meteorological complexities. The rainy season which occurs from June to September is said to be due to oceanic causes. During summer the land warms up more than the sea, but in the winter season the water does not lose its heat so rapidly as the land. This gives rise to the south-west winds, or south-west monsoon as it is called.

During this period of heavy rain and cyclonic storms, dangerous conditions exist on the west coast and also on the coast of Burma. The rain-belt gradually spreads from Ceylon to the north, reaching Calcutta some weeks later than Colombo. The wind direction is not everywhere the same during the south-west monsoon; in the valley of the Ganges it tends to blow from the south-east towards the plains of the Punjab. In October the north-east monsoon sets in, the change in the direction of the wind being due to the increase of pressure in Central Asia. This is followed by what is known as the retreating monsoon, when fine weather appears in the north-west, and the rain belt recedes to the south-east. Usually, by about the end of October the rainy area has "retreated" to Madras. Owing to the interaction of the north-easterly winds, and those from the south-west which continue to persist in the

The Monsoons —and Why

Bay of Bengal, severe storms and boisterous weather are experienced intermittently until the end of the year.

From January to March the north-east monsoon period continues and fine weather with clear skies prevails over the greater part of India. This is the best period of the year for aviation, although a certain amount of morning fog may be encountered in the north. From April to the end of May the hottest weather is experienced, there being a rapid and continuous increase in temperature during these months.

It will be seen that, between the rainy season which is general throughout India during the south-west monsoon and the fine weather from January to March, there are two transitional periods when the climatic conditions vary considerably in different parts of the country. The need for a good meteorological service is readily apparent when it is realised that although conditions generally are suitable for aviation during a large proportion of the year, there are many dangers to be guarded against. These comprise violent thunderstorms and rainfall, hail and snow and turbulent winds in mountainous country, sudden dust storms which blot out all visibility, low clouds and sometimes a tornado.

Flooded Aerodromes

WHEN inaugurating their line to Batavia, the K.L.M., who have, perhaps, had the greatest experience of such conditions, expected that the monsoon rains would have the most unfavourable effect on the regularity of the service. It was found in practice, however, that their aircraft were seldom delayed from this cause, and when delays were met with it was generally due to the flooded state of the aerodromes and not so much to difficulties in flight. This problem of aerodrome flooding will eventually have to be met by the construction of properly prepared runways of concrete or asphalt. This will be a somewhat expensive proposition, as the runways themselves tend to complicate the drainage system, which has to be adequate to carry off the surface water which cannot be absorbed.

Motorless flying has a few devotees in India, but, unfortunately, owing to lack of financial support, little progress has been made. There is an Indian Gliding Association—affiliated to the British Gliding Association—which was formed in 1931, with headquarters at Bombay. As reported in *Flight*, the chairman of the association, Mr. A. N. Moos, recently broadcast an appeal for Government assistance, and in view of the known sympathy with the aims of the movement of the Director of Civil Aviation, who is president of the association, and the example set by the home authorities, it is hoped that Government support will be forthcoming.

The Indian Gliding Association

THE Indian Gliding Association owes its inception to the enthusiasm of a pioneer Indian airman, Mr. Kabali, who made a special study of gliding in Germany. On his return to India he called a public meeting at the Taj Mahal Hotel in Bombay, which resulted in the formation of the association.

A training ground was procured in the hilly country of Aundh—a native State in the Bombay Presidency—and was kindly placed at the disposal of the association, together with the necessary hangarage, by the ruler of the state. Two gliders were ordered from Germany and one from America, and a number of pilots have been trained, although progress has been slow from lack of funds.

FROM THE CLUBS

Events and Activity at the Clubs and Schools

YORKSHIRE

Nineteen hours have been flown during the week on club machines. In view of the success of the recent dance held at the clubhouse, Yeadon, it has been decided to hold another and similar dance at the clubhouse on Saturday, February 2.

BRISTOL

Good flying weather prevailed during the week. Mr. C. F. Key made his first solo flight, and Mr. A. J. C. Percy completed tests for his "A" licence. There is one new pilot member, Mr. I. S. Jenks.

LIVERPOOL

For the fortnight ended January 17, 60 hours have been flown. Visibility, on the whole, had been bad. A "treasure hunt" will be held at Speke on Saturday, January 26, commencing at 18.00 hr. Night flying will also take place.

HANWORTH

An additional machine will be added to the club's fleet of "Moths" (which machines, incidentally, are being fitted with "Gipsy II" engines) during the next few days. During the past week 26 hr. 25 min. of flying were logged. Night flying with the illuminated banner was done on Wednesday. Mr. Tweddle has taken delivery of his "Martlet" after its C. of A. overhaul.

HERTS AND ESSEX

Last week the club flying at Broxbourne totalled forty-eight hours, including a first solo by Mr. A. Poole. Five new members joined the club.

The fancy dress dance held on January 17 was a huge success, some 150 members and friends being present, and all, with the exception of about half a dozen, were in fancy dress. To-day the "pilots only" dinner is being held at the King's Oak, High Beach, Essex.

CINQUE PORTS

Mr. Ken Waller, the second instructor, went over to Belgium last week to attend various functions in his honour. On Thursday the King of the Belgians presented him with the Order of the Royal Lion. Mr. L. H. T. Cliff, the third instructor, has gone to St. Moritz for a fortnight, where he will compete in the world's skating championships. Flying times for the week, dual and solo, amounted to 15 hours.

The date of the club's annual dinner and dance will be announced shortly.

READING

A return "spot landing" match between Brooklands and Reading was held on Sunday, January 20, when Brooklands avenged their defeat of last year with a win by an average of 8 ft. The winners were duly presented with the "Challenge Trophy," an extremely ancient and battered pint tankard, and flew off waving it in triumph. A final competition is to be held on a neutral landing ground.

During 1934 the hours flown by pupils and members of the Phillips and Powis School and the Reading Club were 2,367, against 1,862 for 1933 and 1,653 for 1932. At the end of the year the School fleet consisted of three Miles "Hawks" ("Cirrus IIIA") and two "Moths" ("Cirrus").

At lunch-time on Sunday last there were fifteen machines on the aerodrome.

BROOKLANDS

Mr. Lloyd Mannering, a private owner, acted as "best man" to two fellow-members of the Brooklands Flying Club at their wedding, after which the bride and groom returned from Hatfield in a club machine. Group Capt. Leckie visited Brooklands on Tuesday and flew with Capt. Davis to Northampton. Capt. Davis also flew to Amsterdam and delivered a new "Leopard Moth" to Mr. Van Marken, a member of the club. A successful tea-dance was held at the club on Sunday.

The amateur theatricals are making good progress, thanks to the assistance of Mr. Clifford Mollison. The Brooklands team won the return landing competition against Reading (this time at Reading) on Sunday. The annual meeting of the club will be held on January 26th. This meeting will be followed by a cinema show.

CARDIFF

The week's flying amounted to 13 hr. 40 min., of which 7 hr. 15 min. represent "solo." Flights were made to Bristol and Heston. There are three new social members.

WITNEY AND OXFORD

One of the club's machines is being fitted with blind-flying instruments, and instruction on this aircraft will be available at £2 per hour. During the week 8½ hours dual and 8½ hours solo flying were recorded.

ABERDEEN

Clear and frosty weather has enabled pupils of the Aberdeen Flying School to do plenty of flying, some of it at night. There are two new members. The opening of the Dyce Aero Club has proved a great asset as meals may be obtained.

Mr. E. L. Gandar Dower hopes soon to be able to announce that wireless will be installed.

CAMBRIDGE

At Marshall's Flying School and the Cambridge Aero Club flying times last week were 22.15 hours dual and 4.45 hours solo. Mr. Sleight went solo on Wednesday, and on Thursday Mr. Purkis renewed his "A" licence. The Civil Aviation Service Corps put in 5½ hours' flying on Sunday.

NORTHAMPTONSHIRE

During last week Miss Bradley took a trial lesson, and Mr. Keunen commenced his flying instruction.

The club has invited the Pipewell Foot Beagles to meet at the aerodrome on February 16, and if any private owners would care to come the club will be delighted to see them. The meet will be followed by a dance in the clubhouse.

NEWCASTLE

It is encouraging to note that the total flying time for the year up to January 20 is 76 hours, an increase of 55 hours over the corresponding period of 1934. During the past week 44 hr. 10 min. have been flown. The annual dinner-dance will be held at Tilley's Barras Bridge Assembly Rooms, Newcastle-on-Tyne, on Tuesday, January 29. Tickets can be obtained from the Honorary Secretary, Cramlington Aerodrome.

NORFOLK AND NORWICH

Mr. Collier has been at Reading aerodrome taking a special course of instrument flying, and Mr. A. Kirby, the hon. instructor, who has been carrying on his work, has had a busy week. Mr. D. E. Gillam is stopping at the club to put in some flying before returning to school.

The club has already received an application for admittance to the next Public School Aviation Camp. This augurs well, for schools have not yet received details. During the week Messrs. A. A. Rice and D. E. Gillam took "refresher" courses, and there were nine soloists. Mr. G. H. Winn, from Portsmouth, visited the club in a "Spartan."

The annual dinner will take place at the club on Friday, March 29. Guests will include the Director-General of Civil Aviation and Mrs. F. C. Sheldermine, the Lord and Lady Mayoress, and the President and Mrs. H. N. Holmes.

HAMPSHIRE

That 1934 was even more successful for the club than previous years is proved by the following figures. Altogether 2,139 hours were flown on club aircraft, compared with 1,825 hours in 1933 and 1,612 hours in 1932. This flying was done mainly on four aircraft. In April 28 hr. 55 min. were flown in one day. Towards the end of last year another "Moth" was acquired. The fleet now comprises three "Moths" ("Gipsy I"), one "Moth" ("Cirrus II"), and one Spartan three-seater ("Gipsy II"). One machine is fitted with night-flying equipment.

No fewer than fifty-eight new pilot-members joined the club, and forty-one members qualified for their "A" licences. Among these were Mr. R. P. G. Owen, who commenced his instruction on a Wednesday afternoon in May, made his first solo flight on the following Friday, and qualified for his "A" licence on the following Sunday. During the summer months "dawn patrols" were made to Brooklands, Hanworth, Reading, and Wilmington.

WEST LONDON'S AIRPORT

Ambitious Plans for the Coming Season at Heston : Building Extensions and New Night Landing Equipment

THE Heston development programme for this year includes building extensions, land extensions, and additional night landing equipment, all of which have been rendered necessary by the general increase in air line activity. Full details of the land extension programme are not yet available, and these will be published in a later issue.

The most important of the new buildings will be a workshop and office hangar capable of accommodating the largest British machines, with over fifty feet of door width to spare. The hangar will be constructed of steel, roofed with corrugated material, and will incorporate a large quantity of glazing. It will have an unobstructed entrance 200 feet in width, and a total floor area, including workshops, of 54,030 sq. ft. The space available for aircraft will be 250 feet wide by 126 feet deep.

While its design will contain no radical departures from accepted practice, though conforming with the requirements for a factory under the Factory Act, it is anticipated that, by careful planning and use of materials, the building will be economical in cost, having regard to the large accommodation provided. This includes 5,450 sq. ft. of space on the upper floor, which will house the offices of Airwork, Ltd., transferred from their present position on the opposite side of the central buildings. The present service and office hangar, when vacated, will be used for the housing of aircraft of a span up to 100 feet.

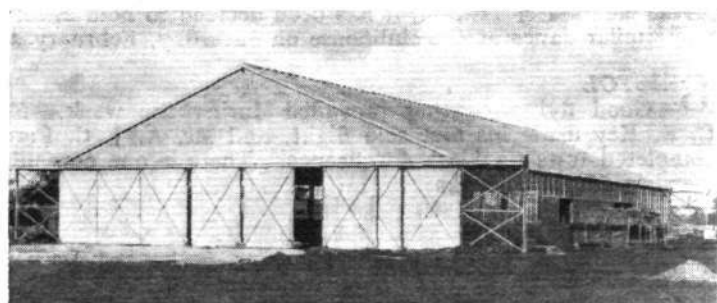
The demolition of the present small *depôt* hangars occupied by Henlys and Brian Lewis, to make space for the large service and office hangar, has necessitated the provision of further housing space to be used, at any rate for the present, by these firms. This is now completed and occupied in the shape of a new hangar near the Heston Aircraft Company's factory to the north-west of the landing area. This hangar is 200 feet in depth and 100 feet in width. Sliding doors at each end run into grooves extending outside the walls, and in this way the whole width is included in the door space at each end, which opens on to two concrete aprons which will be lit by floodlights. An office, stores and vestibule are annexed to the centre of the east elevation.

School and Club Modifications

The volume of passenger traffic handled in 1934 has rendered necessary certain modifications to the passenger station which was constructed at the beginning of the year. Incoming and outgoing passengers will now be kept separate. The removal of the flying school to a new building extension to the west of the clubhouse, and the removal of the Customs office to the space now occupied by the airport superintendent, will leave vacant two adjoining rooms for the use of the superintendent and of the traffic staff—brought by this means into closer contact and provided with much-needed additional space. The school is to be accommodated in a new western extension of the clubhouse. Locker rooms and cloakrooms will be provided for flying pupils, a private clubroom and snack bar for members of the Airport Club, and on the first floor will be located the clubrooms of the Household Brigade and Old Etonian flying clubs, removed from their existing premises beneath the control tower.

A block of glass-fronted showrooms and offices, similar to those at present occupied, is being built on to the west of the concrete hangar, facing west and at right angles to the other showrooms. Heston is indebted to Mr. J. R. Bryans, a member of the club, for the provision of two squash courts which are now under construction to the south of the concrete hangar and to the east of the approach drive. The courts will be equipped with changing-rooms, showers, and so on, and will provide gallery accommodation for about fifty spectators.

The present Chance-Airwork Shadow-Bar floodlight is being supplemented by two additional floodlights, each of $5\frac{1}{2}$ kW and $1\frac{1}{4}$ million candle-power, operated from the control tower, but sited on the boundaries of the aerodrome. The three floodlights will be worked according to the direction of the wind, the light facing the incoming pilot being switched off. The shadow-bar will be retained for use in emergency. An entirely new design of boundary light will be adopted towards the end



The new hangar on the north-west side of Heston. Brian Lewis, Ltd., and Henly's, Ltd., will be the tenants while their existing quarters are being rebuilt.

of February. The general arrangement of each single light consists of two electric lamps. The uppermost lamp is covered in with an amber glass globe, and the lower lamp illuminates a white opal glass cylinder 3 ft. high, extending to the ground; this shows the height of the boundary light and gives the pilot an indication of perspective. The lights are to be operated on a distribution voltage of 230, which will be stepped down to 6 volts by a separate transformer fitted at the base of each individual light.

The advantages of this system may be summarised as follows: (1) In the event of a lamp in any of the boundary lights failing, the voltage of the lamps in the other lights does not increase. (2) There is no danger of electric shock or fire, owing to the fact that the portion above ground is operated on a 6.6 volt supply connected from the secondary of each transformer. (3) In the event of one or two lamps failing, the remainder of the system continues in operation. (4) In the event of the boundary light being hit by an aeroplane, the glass cylinder will collapse and damage resulting to apparatus or personnel is reduced to a minimum.

Two new appointments to the Board of Airwork, Ltd., have recently been made in the persons of Mr. T. L. E. B. Guinness and Mr. J. L. Walsh. The three existing directors, of course, are Mr. H. N. St. V. Norman, Mr. F. A. I. Muntz, and Mr. R. P. G. Denman. Mr. Guinness, who has taken a large financial interest in the firm, is an M.P., and aviation is prominent among his many other activities. Mr. Walsh will represent the Whitehall Securities Corporation, Ltd., of which he is a director.

The Gliding Subsidy

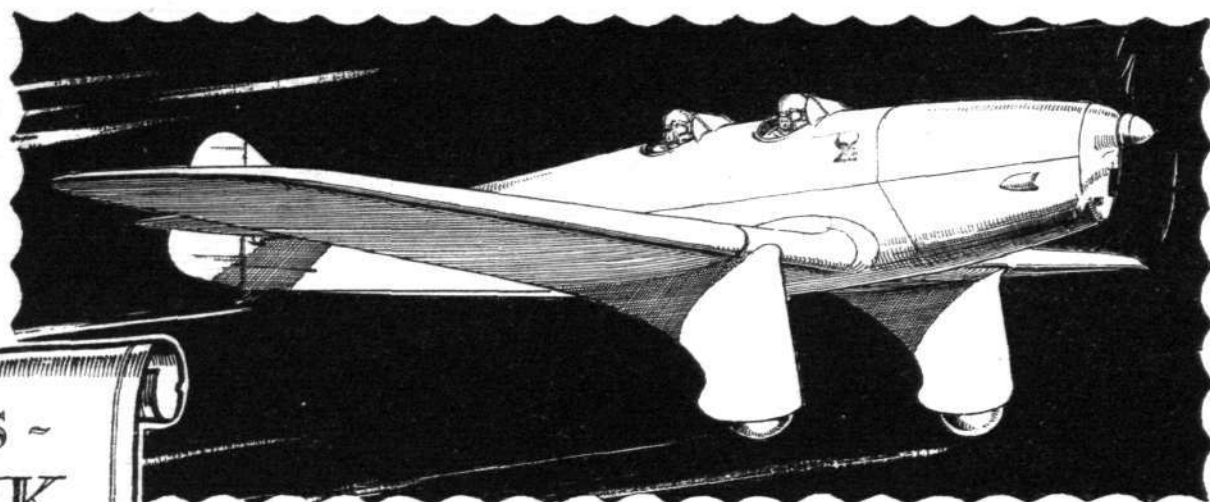
In last week's *Flight* it was mentioned that the British Gliding Association would hold a meeting on February 1. Actually the meeting (for members only) has been postponed to the following day, and the rules for reconstitution will come up then for ratification.

The B.G.A. points out that the Air Ministry requirements mean *apparently* that two-thirds of the existing clubs will not be eligible for the subsidy, and that some of the Founder Clubs—including the Dorset, which holds the duration record—may be disaffiliated.

Progress at Redhill

Although serious school work will not be started until the spring, preparations are going ahead rapidly at British Air Transport's new aerodrome at Redhill. In due course it will be possible to obtain "A" and "B" licence instruction, blind and night flying courses, wireless courses (which have already started), and Autogiro instruction.

B.A.T., incidentally, have recently taken delivery of their C.30 Autogiro, and the instructors, Messrs. R. F. Bulstrode and J. R. Hatchett, are very busy putting in hours with it. Redhill should be one of the best-equipped schools in the country.



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CIVIL AERODROME DEVELOPMENT

*Need for a Central Control Board Again Stressed : Points from a Paper
Read before the Institute of Transport by Sir Leopold Savile*

NOT only at the S.B.A.C. Conference has emphasis been put upon the need for a civil aviation Central Control Board. The point was also made in a paper on civil aerodrome development read before the Institute of Transport in London last week by Sir Leopold H. Savile, K.C.B., M.Inst.C.E.

Sir Leopold made an initial reference to the history of civil aerodromes, and remarked that even now the progress that had been made in aerodrome construction in this country had been very slow and did not bear comparison with that achieved in some other countries. Since the opening of Croydon as a civil airport the construction of aerodromes had been started in various parts of the country, and by 1934 there were forty-three licensed for public use, ten of which had customs facilities. In addition to these, there were thirty-six privately owned aerodromes.

Of the public aerodromes, fifteen belonged to municipalities, and many had applied to the Aerodromes Advisory Board for advice. Suitable aerodrome sites were, however, becoming more and more difficult to acquire, and no time should be lost in the selection of a suitable site.

Sir Leopold then gave a short summary of the early air services emanating from and developed in this country, followed by a list of those operating at the peak period last year.

Types of aerodromes might, he said, be considered under three main types: Large terminal airports, municipal aerodromes, and private aerodromes. The first-named should have facilities for dealing with the largest aeroplanes, and should be situated as close as possible to the town concerned. The second type would be similar except that it would not be necessary to provide facilities for customs or police, and the layout generally would be on a less elaborate scale. The provision, however, of a safe and suitable landing ground at all times and in all conditions of weather was of the first importance in this as in all types of aerodromes; it was also important to provide rapid communication with all parts of the city which was served. As the foregoing types of aerodromes were intended for the use of the public they would require to obtain an Air Ministry licence, as would private aerodromes where facilities were provided for instruction in flying and for privately owned aircraft, or where manufacturers tested their machines. Private aerodromes for personal use, constructed on the owner's own land, did not require to be licensed.

Looking Ahead

Besides these recognised types it might be that in the near future, with the development of Autogiros or similar machines, a comparatively small area of land might be made available near the centres of large towns. There had also been proposals for utilising the roofs of large buildings.

The first and principal requirement for all types of aerodromes was the provision of a suitable site capable of being so developed that it would provide a safe landing and taking-off ground at any time during the day or night and under all weather conditions, for the types of aeroplanes which might now or in the future be expected to land there. It should be situated as near as possible to the centre of the town, but not on the side opposite to that from which the prevailing wind blew. Aerodromes should not be situated at the foot of, or near, hills or high ground on account of induced air currents and general obstructions. Buildings such as tall chimneys and church spires should be given as wide a berth as possible, and the aerodrome should be located at least a mile away from

overhead high tension cable lines, unless such obstructions can be placed underground. An obstruction diminished the available space for landing and taking-off by a distance equal to ten times its own height, measured from the foot of the obstruction.

An important factor was that it should be so situated that there existed or could be provided a rapid means of transport to the town.

The dimensions of an aerodrome to be used by the largest aircraft should not be less than 800 yards in all directions, and it would be advisable, if possible, to purchase land to allow for 1,000 to 1,200 yards. Only in very exceptional circumstances would the Air Ministry license a site affording a clear run of less than 600 yards in any direction. For small aeroplanes a site measuring 400 yards in all directions sufficed, provided the ground outside and within 100 yards of the perimeter of the aerodrome contained no obstruction higher than the average three foot fence or hedge.

Drainage Problems

A large number of engineering problems also had to be considered before the final selection of a site could be made. Gradients should not be excessive—the average should not exceed 1 in 50. On the other hand, too flat a site might present drainage problems. This was a very important consideration. Large areas needed to be drained with a much quicker run-off than was necessary for agricultural purposes. The system generally employed was to use surface intercepting drains of the French type, feeding into main collector drains. It had been found that land which, at first sight, appeared impossible could be satisfactorily dealt with at a reasonable cost. French drains were usually placed at the edges of aprons to connect with the main system.

The main requirements of a good surface for an aerodrome were that: (a) It should be hard enough to carry the weight of machines. The Air Ministry had laid down that a landing field must be capable of withstanding a rolling pressure of two tons per square foot, and the test they recommend is to drive a fully laden 3-ton lorry slowly across the field. (b) It should be soft and resilient enough. (c) It should be as cheap as possible to lay and be capable of quick and easy repair. (d) It must be free from dust and be non-sticking and non-skidding. Generally speaking, the grasses used should be tough hard-wearing, short grasses with creeping root systems.

Although a well-maintained grass field would provide a suitable landing ground, an artificial surface might have to be provided, at any rate for a portion of the landing ground, as was done in America and elsewhere. Various types of surface had been used in the construction of runways, the type adopted at any particular site usually being dependent on local conditions of labour and materials available. Several examples of asphaltic concrete runways had been constructed, and this material appeared to give better results, while being somewhat cheaper. Good results had been obtained with "oiled earth" runways, which was a much cheaper form of construction. It consisted of mixing the natural earth, or ashes, with ordinary asphaltic road oils either in a mixing machine or *in situ*. A good, fairly hard surface was obtained. The surface was impervious to water and had to be drained in a similar manner to all hard surfaced areas.

An important feature in the development of a large airport was to prepare a lay-out plan of the area to allow for future development. Drainage and grading operations should then be conducted to conform with this lay-out.

Building requirements were entirely dependent on the function of the aerodrome. Sir Leopold said that

which followed very closely that given by Mr. Nigel Norman in his S.B.A.C. paper, reported elsewhere in this issue. Even a small private aerodrome, he said, should have a central building, hangars, repair shop, stores, and garage. Efforts should be made to keep the height of all buildings as low as possible, though the control tower should project one storey above the building. The siting of the buildings in relation to the flying field called for careful consideration, and flying gaps of at least 200 yards in width must be left at regular intervals wherever the line crossed an important prevailing wind. By the Duval plan the buildings were grouped together in a wedge-shaped sector of a circle the angle of which, sub-divided by the centre of the field, was not more than 45 deg. The terminal building was placed in front and projected into the flying field. The other buildings were placed behind it on either side of the wedge, divided by a road leading up to the terminal building.

Wind direction indicators must be installed, and these should be in such a position and of such a size that they were readily visible from all directions at a minimum distance of 2,000 feet. Wind tees had been largely employed and had proved satisfactory. It had been suggested that they should be arranged to return automatically to the "no wind" position for velocities of less than four miles per hour.

Unless adequately marked, an airport will lose a considerable amount of value to the flying public, and the marking should be easily discernible at an altitude of 2,000 feet, and should comprise boundary markers and some form of identification marking.

Although very little night flying was done in this country at present, we might expect to see a considerable increase in the future, and main airports must have adequate provision for night lighting.

Provision must be made for rapid fuelling. Apparatus for heating oil in cold weather, and a compass rose for swinging aircraft might be necessary. Sir Leopold also touched on the development of radio blind-landing equipment.

After impressing the necessity of planning for future development he gave a full history of the work of the Aerodromes Advisory Board. It might be anticipated, he said, that the value of such a body would increasingly be appreciated by all those requiring advice in connection with the construction of aerodromes and seadromes.

With regard to the future it was impossible to indicate the developments, but the organisation should exist capable of dealing with such developments whatever they might be. Such control as existed at present was exercised by the Civil Aviation Department of the Air Ministry, but they had no real authority. The Aerodromes Advisory Board had no authority and could only give advice. A Control Board was necessary with adequate powers, and this could be created either by enlarging the powers of the D.C.A. and appointing a representative board, of which he would be chairman, or by creating an independent board of the nature of the Central Electricity Board.

If the first were adopted the question arose as to the policy of placing the direction of what are civil matters under the control of a branch of a fighting department, but he thought that whatever objection there might be for this the value of the close co-operation between the works department of the Air Ministry and the D.C.A. would outweigh possible disadvantages.

Sir Leopold closed his paper by stating firmly that the question was of considerable urgency if the confusion and waste of money that was occasioned by the want of a central control of railway construction was to be avoided.

THE DISCUSSION

OPENING the discussion, Mr. John Dower stressed the town-planning aspect of aerodrome construction; he felt that this was one of the most important points which should be borne in mind when laying out aerodromes. Regarding Sir Leopold's suggestion that a controlling board should be instituted, he thoroughly agreed in principle, but he felt that the board would best be one of the public utility type, and not a purely Government department like the Air Ministry.

Mr. Nigel Norman thought that one of the most difficult problems in connection with aerodromes was that of ground transport between the aerodrome and the city. It was a problem, he said, which was worthy of consideration by the Institute of Transport. He felt that it would, to a certain extent, be solved by Autogiro-type aircraft making short distance flights from the aerodrome to the centre of the city.

Major Szlumper agreed that "terminal delay," as he called it, was one of the most difficult problems to solve in connection with transport. He thought that short-distance Autogiro services would be likely to prove a menace to other commercial aircraft using the aerodromes. Turning to the rate of increase of the public use of air transport, he said that the curve of this rate lagged a long way behind that of trains and motor cars. He very much deprecated the lack of departure arrangements, which necessitated passengers walking out to the machines in the open. He did not think the constitution of the Aerodromes Advisory Board was sufficiently representative of the operators; he felt that they should be asked where they wanted aerodromes before the survey of probable lines was made.

Mr. G. L. Pepler eulogised the Aerodromes Advisory Board and said that, above all, they wanted a survey made of the air transport possibilities of the country on economic lines, and they wanted it as soon as possible.

Mr. Ivor McClure pointed out that there was nothing new in Sir Leopold's suggestion of the formation of a controlling authority, as his scheme had already been anticipated, in a somewhat different form, by a memorandum laid before the Government by the aviation section of the London Chamber of Commerce last August, and this scheme had since been elaborated in a paper read before the Air Transport Conference on January 10 by Major Thornton.

The Chairman, Mr. S. E. Garcke, suggested that the con-

stitution of the Aerodromes Advisory Board was insufficiently representative of both transport and air interests. He thought that it required experts who were capable of dealing with problems of traffic congestion, particularly at aerodromes; as things were, the problem of congestion in cities would be made even worse than it was now.

New Aviation Insurance Company

Aviation and General Insurance Co., Ltd., is the title of a new firm in which the following twelve insurance companies and two firms of brokers are participating: Alliance Assurance Co., Atlas Assurance Co., Economic Insurance Co., Employers' Liability Assurance Corporation, Guardian Assurance Co., Legal and General Assurance Society, Northern Assurance Co., Norwich Union Fire Insurance Society, Pearl Assurance Co., Prudential Assurance Co., Royal Exchange Assurance, Yorkshire Insurance Co., C. T. Bowring and Co. (Insurance), and Matthews Wrightson and Co., Ltd.

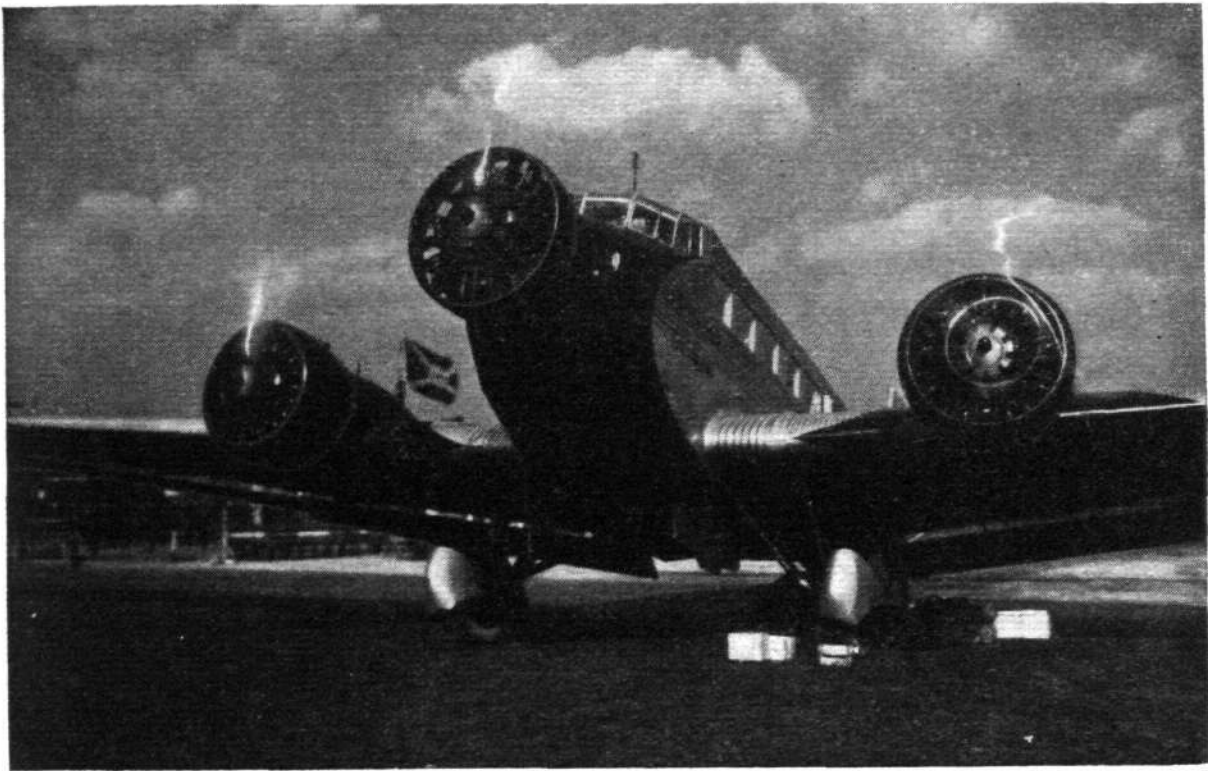
The board of directors consists of Mr. A. Levine (general manager of the Alliance), Mr. C. H. Falloon (general manager of the Atlas), Mr. E. H. Murrant (director of the Economic), Viscount Knollys (managing director of the Employers' Liability), Mr. A. G. Sweet (general manager of the Guardian), Mr. W. A. Workman (general manager of the Legal and General), Sir Joseph Burn (general manager of the Prudential), Mr. A. MacDonald (general manager and secretary of the Royal Exchange Assurance), and Mr. W. E. Hargreaves (director of C. T. Bowring and Co. (Insurance), Ltd.). Mr. Levine has been appointed chairman, Mr. MacDonald deputy chairman, and the secretary is Mr. A. E. Pulleyn.

The offices of the company will be in Asia House, Lime Street, London, E.C.3, and it is expected that business will begin on February 18. The capital of the new company is 500,000 shares of £1 each, and it is proposed to call up 10s. per share. The whole of the capital has been subscribed by the participating companies, so there will be no public issue.

Mr. L. Murray-Stewart, who for some time was with the British Aviation Insurance Co., Ltd., and has more recently acted as underwriter for a group of British and American insurance interests in the United States, will be underwriter of the new company.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



The Ju 52, used on the D.L.H. night mail, "running up" at Cologne.

NIGHT MAIL

For Seven Years Deutsche Luft Hansa have Operated a Mail and Freight Service between London and Berlin with an Average Reliability Figure of 95.9 per cent.

ALTHOUGH many casually interested persons—and certainly those living in the vicinity of the Airport of London—know that the mail is flown from Croydon to Berlin every night by Deutsche Luft Hansa, very few realise that this service has been in operation since April, 1928.

During that year and 1929 it was run at night one way only—from Tempelhof (Berlin) to Hanover, Cologne and London—but thereafter, with occasional and temporary alterations, mail machines left Berlin and Croydon at 10 p.m. Since March 15, 1933, when that season's operations started, the service has been run all the year round and with almost incredible reliability. Last year, for instance, the figure between January 1 and October 31 was 98.8 per cent. and, as November and December were "hundred per cent. months," the official figure for the whole year will be even better than that for the initial ten months.

Wireless assistance—D.L.H., incidentally, use telegraphy—has been of paramount importance and the operating crews have remained on each particular section for long periods. Actually, six pilots are covering the route. Until 1931

Junkers G.24s (three 280-310 Junkers L5) were generally used, and during the past three years Junkers Ju 52s (three 525 h.p. B.M.W. "Hornets") have been on the service.

The figures for freight and mail are good, but currency and import restrictions have not permitted these totals to be as high as they might have been. The relatively better loads for the first two years are partially explained by the fact that the service to Berlin was run in daylight *via* Amsterdam, when fresh flowers, more often than not, made up a useful portion of the load.

Year.	Period.	Freight. lb.	Mail. lb.	Mileage.	Per cent. Reli- ability.
1928	Apr. 23—Sept. 29	221,957	76,220	174,164	90.5
1929	May 1—Nov. 15	524,898	150,458	260,600	94.1
1930	Apr. 5—Oct. 15	275,285	70,019	259,287	94.1
1931	Apr. 1—Oct. 15	357,981	90,246	262,511	98.8
1932	Apr. 1—Oct. 31	306,066	73,086	258,843	99.5
1933	Mar. 15—Dec. 31	456,561	145,397	347,368	95.4
1934	Jan. 1—Oct. 31	552,869	226,390	358,612	98.9

To the Isle of Man

Some idea of the prospective traffic on the Blackpool and West Coast Air Services' Isle of Man run can be gained from the fact that when Mr. Gordon Olley's charter "Dragon" was in the north and was loaned for the service there was no difficulty in filling both this and the machine normally used.

When Olley Air Service, Ltd., obtain their second D.H.89 "Rapide" one of their "Dragons" will be put on the supplementary mail and passenger service to the Island. Both Barton and Newtownards, of course, have radio equipment, and,

using back bearings from Barton, the "Dragon" has been running very consistently during the winter.

R.A.S. Reliability

Barton and Newtownards radio stations have been of no small assistance to Railway Air Services on their Belfast and Glasgow service. During the winter months the D.H.86s have covered the run with 92 per cent. reliability, though naturally enough, the amount of traffic during this initial winter has not been startlingly great.

Commercial Aviation**CROYDON****Traffic Congestion in 1935? : Those Press Arrangements : Starting Young**

LOOKING at some of the schedules in and out of Croydon for the summer, I am not surprised that the Air Ministry has taken the bull by the horns and issued a special "Notice to Airmen" appealing for the minimum possible communication by wireless from pilots in flight to the ground station. One newspaper finds significance in the fact that "this follows a statement by Hillman pilots that their appeals to the Croydon control often go unanswered far too long."

The Croydon Control Tower acts with strict impartiality—as foreign firms will readily agree. Some delay is, at present, inevitable, but most pilots are intelligent enough to know that it cannot be helped and do not "write to the papers" about it.

Aerial traffic congestion will be one of the most vital problems within a year or two. Spanish, Italian, Scandinavian, and even Czechoslovakian companies already show signs of a desire to fly through to England within a year or two, and the programme for the summer of 1935 is heavy enough to make present traffic problems difficult of solution.

New Services

Imperial Airways will have five services each way on the Paris line and Air France three. There will be five return flights between England and Holland by K.L.M. and one, if not two, D.L.H. return flights. On the London-Brussels-Cologne line, shared between Sabena and Imperial, there will be four services each way as well as the D.L.H. night service. Internal routes will be busy, too, for "Provincials" will fly both northwards to Hull and westwards to Penzance. Railway Air Services make no announcement, but more services may possibly be expected in and out of Croydon from this company. Spartan Air Lines filled very many machines to and from the Isle of Wight last season, and this popular line will surely increase passenger bookings.

Very many small machines, by the way, place considerable extra strain on the traffic control system. This cannot be helped at present, but there does seem to be need for economical fourteen-seaters on several internal lines.

Apart from Hillmans, who may have more Paris services, this is likely to be an hourly service from Gatwick to Paris, so things will be hectic on that route in bad weather. The mail contract to Blackpool and West Coast Air Services, Ltd., mentioned in last week's issue, seems a well deserved

one, for throughout the winter the services have been showing over 97 per cent. regularity—an amazing record considering northern winter weather conditions.

When the Infanta Beatrice of Spain, Prince Alessandro Torlonia and Count Corvadonga stepped from an "Imperial" Paris machine at Croydon last week there were batteries of Press cameras and platoons of Pressmen. When the Duke and Duchess of Kent arrived from the same place by the same means no cameras or Press people were allowed on the tarmac. I am told that the only pictorial representation of the Royal arrival featured a bit of the main gateway and gave an admirable advertisement to a well-known brand of motor car. Talking of Press photos, one of the best I have seen for a long time appeared in several papers last week. O. P. Jones, jun., 11½ years of age, in the uniform of a "Worcester" cadet, stood below a big "Imperial" machine saluting O. P. Jones, sen., who stood in the cockpit doorway gravely returning the salute. The occasion was the day on which young Jones was to "join his ship" for the first time and, as his father had to take a Paris service, they said good-bye on the tarmac. The idea is, I believe, to spend some five years as a "civil aviation" cadet on the "Worcester" and then to graduate to Air Service Training, Ltd., Hamble. Four years at Hamble should turn a lad out with "B" licence, second-class navigator's certificate, and so on, all ready, in fact, to become an Imperial Airways first officer in due course. Capt. O. P. Jones, incidentally, went down to the training ship in which his son is now one of the first "air" cadets, in order to inaugurate this civil air cadet section.

"Tim" Woods, late of Hillman's Airways, was seen at Croydon recently with a magnificently equipped and luxuriously upholstered "Dragon Rapide," the property of Major Anson, to whom "Tim" now acts as personal pilot.

Nothing whatsoever appears to have been done about the alterations whereby passengers' passports could be examined before they declare their baggage. Local experts foreshadow that preparations to tear the Customs Hall to pieces will be made about June, when traffic is heaviest and that a meeting will then be called to discuss the advisability of starting structural alterations sure to dislocate air traffic. The result, it is thought, will be the postponement of the whole matter until the following winter.

A. VIATOR.

Berlin to Shanghai?

There are rumours that D.L.H. and the Eurasia Aviation Corp., Pekin (in which D.L.H. hold a third of the capital) may open a service this summer between Berlin and Shanghai, using the normal route through India.

The Irish Subsidy

The subsidy which Aerlingus Eireann (Air Fleets of Ireland) are seeking from the Government of the Irish Free State is about £25,000 per annum for a fixed term of years. The Minister for Industry and Commerce (Mr. Sean Lemass) has been considering the company's proposals for some time past, but has not yet announced his decision and may refer the matter to a Civil Aviation Committee which is to be set up. The plans of the promoters of Aerlingus Eireann include a twice daily service between Dublin and London and a daily service from Cork to Dublin. It had been hoped that the services would commence on May 1 of this year.

Developments at Dyce

The extension work at Mr. Gandar Dower's Aberdeen airport is going ahead rapidly, and should be complete in good time for the season's operations. Incidentally, Mr. E. D. Ayre, who has been in charge at Barton during the past year, has gone up to Dyce to look after the aerodrome and operational side of both the school and Aberdeen Airways, Ltd., leaving Mr. Gandar Dower free to attend to policies, people and politics. Mr. Ayre's considerable experience of control and radio assistance at Barton should be of inestimable value when Dyce obtains its radio equipment and when the projected service to London has been opened. Mr. Starling, of course, remains as chief pilot. All the aerodrome buildings are now fitted with telephones.

For the Africa-South America Service

A triple-engined low-wing monoplane with retractable undercarriage is being built by the Société des Avions Bernard for use on the Africa-South America service. It will seat six, including the crew, and its total payload will be about 1,300 lb. Fitted with "Gnome Rhone 9Krs" engines, the cruising speed will be nearly 190 m.p.h., and the range 2,765 miles.

The Irrawaddy Service

On New Year's Day the Moulmein service operated by the Irrawaddy Flotilla Company was extended to Tavoy, and this will now be a regular service. Ye will only be used as a landing place for refuelling when the load warrants it. The service to Mandalay now leaves at 8.30 a.m. instead of 7.30 a.m. on account of the prevalence of fog at Henzada and Mandalay. Both services were operated to schedule and no difficulties have been experienced. A certain amount of special charter work is now coming forward.

To the Channel Islands

It is possible that by the time *Flight* appears this week Jersey Airways, Ltd., will have taken delivery of their first D.H.86 "Express" which is, at the moment of writing, being equipped with radio. Giffard Bay is to be its name.

In due course the "Dragons," or some of them, may be used on the projected Guernsey service which should come into action this summer. The radio question still hangs fire, but it is likely that there will be a major control station on Alderney, where, incidentally, Jerseys are to lay out an aerodrome (having obtained leases from no fewer than 150 tenants!), with subsidiary beam stations elsewhere. Meanwhile the pilots use back bearings on Portsmouth; Rennes has its own station.

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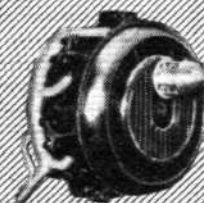
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AN HOURLY PARIS SERVICE?

A High-speed Service may be Operated this Year between Paris and Gatwick. The Douglas Demonstrated

FOR some time it has been known that Mr. Morris Jackaman, of Airports, Ltd., was interesting himself in the possibilities of a high-speed hourly service from Gatwick to Paris, and last Saturday a Douglas D.C.2 was flown over to Gravesend for demonstration by Mr. K. D. Parmentier, with Mr. Fokker himself as a passenger.

There are possibilities that the Southern Railway will build an additional station at Gatwick, which is already on the London-Brighton electric service. Tentative plans suggest that the actual operating company, London and Continental Air Lines, which is at present being formed, may acquire four Douglas machines fitted with British engines, and that the new service may start in June. Gatwick, of course, is well outside the London fog area.

After clearing Customs the Douglas was flown over to Gatwick and thence on a trial flight to Brighton and back with a distinguished passenger list, including representatives of the Southern Railway and of the G.P.O. Brighton was reached in eight minutes!



The Douglas at Gravesend. Below the machine can be seen Mr. Anthony Fokker, Mr. H. Gooding (the Gravesend manager), Mr. Parmentier and Mr. Prins.

After lunch the machine returned to Gravesend and Amsterdam. The object of the demonstration was to decide whether this machine should be used on the projected service.

The Douglas D.C.2s for K.L.M.

The K.L.M. expect to take delivery of their first Douglas next month and the fleet should be with them before the end of April. If the deliveries are made to time the duplicated Batavia services will start at the beginning of May; otherwise there will be two weekly services in action before September. The Douglas will reduce the scheduled time of the trip to five or six days.

The Congo Mail Service

On Saturday, February 23, the Sabena service to the Belgian Congo will be opened, making a fortnightly trip in each direction and carrying only freight and mails. Before the end of the year larger and faster machines, to carry passengers, will be put into service. The connection from London is by the 12.45 p.m. machine to Brussels on the days prior to departure. The return journey will be made on alternate Wednesdays, starting from Leopoldville on March 6. Each trip occupies roughly four days and stops are made at Marseilles, Oran, Reggan, Gao, Niamey, Zinder, Fort Lamy, Bangui and Coquilhatville.

Air Mail Increase

The Postmaster-General announces that the weight of letters sent by air from this country during 1934 was the largest ever recorded and amounted to about 122 tons, as compared with 85 tons in 1933—an increase of 43 per cent. The following is a detailed comparison between the letter air mail traffic for the years 1933 and 1934:

	1933. lb.	1934. lb.	Increase.
Empire air services	98,100	143,700	46 per cent.
Other extra European air services	27,500	30,200	10 per cent.
European services	64,500	98,400	53 per cent.
Total	190,100	272,300	43 per cent.

It is estimated that nearly 6,000,000 letters were despatched by air from this country during 1934 as compared with about 4,000,000 in the previous year. The total weight of air parcels despatched during 1934 was 74 tons, as compared with 67 tons in 1933.

For Feeder Services

In *Flight* of December 20 it was mentioned that, in the light of experience gained with the "Scion," Short Bros. were constructing the "Scion Senior," a high-wing cantilever monoplane with four Pobjoy "Niagara" radials of 90 h.p. each. More details are now available. If desired, two engines of 180-200 h.p. each may be fitted in place of the four smaller power plants, and the machine can be fitted with floats. Up to ten passengers will be accommodated, excluding the crew, making the aircraft an attractive proposition for "short haul" work and feeder line services.

The span is 55ft., the wing area 400 sq. ft., and the wing loading 14.1 lb./sq. ft. A reasonably good ratio of gross to tare weight is promised, the weight empty being 3,291 lb. and the weight loaded 5,640 lb. The maximum speed will be 138 m.p.h., and the machine should cruise comfortably at 120 m.p.h. A landing speed of 55 m.p.h. is promised.

South African Affairs

Since the reorganisation of South Africa's airways there have been, at one time or another, a number of mis-statements reaching England concerning the actual position both before and after the Government took over the operation.

For some time before the end of January, 1934, Union Airways (Pty), Ltd., was in desperate financial straits and had been unable to carry or to procure a sufficient stock of spares. When, therefore, the Government took over, the lack of such material, which could only be obtained from Europe, made the maintenance of services more than difficult, and the fact that they were kept in operation at all reflects the greatest measure of credit on those responsible officials.

It was in July, under the original staff, that what South African papers alluded to as a "series of forced landings"—actually there were only two in operations involving a weekly mileage of 3,000-4,000—occurred. It was after these mishaps that the S.A.A.F. ground engineers were introduced. That there was serious unrest and deterioration of morale among the staff is not questioned, but this was due rather to disappointed hopes among the senior ranks after the company had been taken over by the Government. Considering that Union Airways were in such dire straits, the Government move must have been, in fact, a godsend to the staff.

MODELS

A New A. E. Jones Petrol Engine : Indoor Flying : 1935 Competitions

A NEW 9 c.c. ENGINE

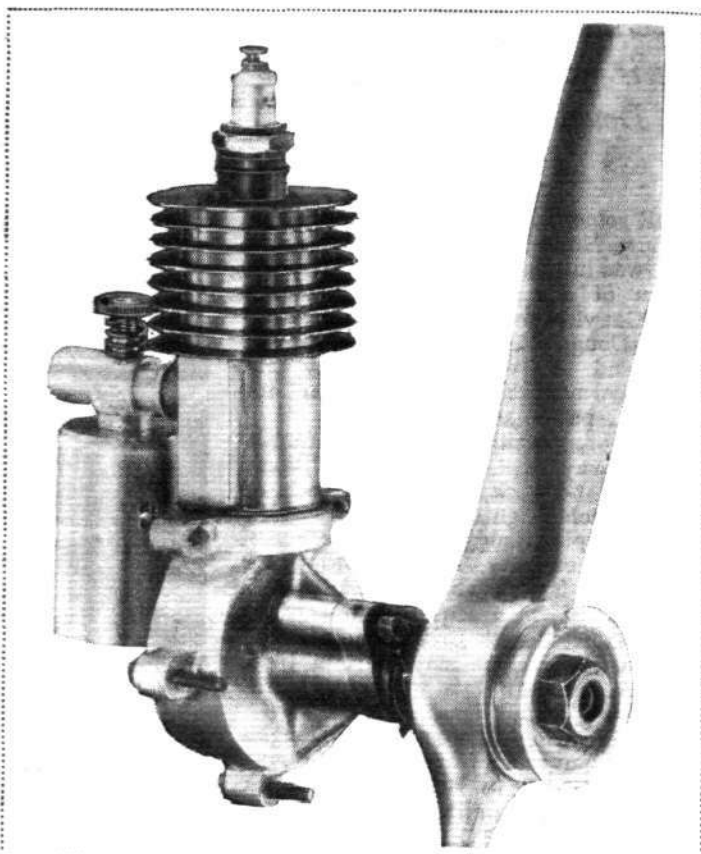
POWER-DRIVEN-MODEL enthusiasts will, we think, welcome the arrival of the latest model petrol engine just produced by A. E. Jones, Ltd., of 97, New Oxford Street, London, the makers of the successful "Atom Minor" engines. Not only is the "Andrich" engine, as it is called, of the size and power that should appeal to a greater number of model builders than did its larger brother (or sister, as the case may be!), but, judging from our inspection of one of these engines, it would appear to possess a performance that should rank it amongst the most successful of model petrol engines yet produced.

At the moment we are not at liberty to give many details concerning its construction, but it is a featherweight high-performance engine of only 9 c.c. capacity, operating on the two-stroke principle, and using a petrol mixture. Its weight, complete with sparking plug, contact breaker, carburetter, and two-minute fuel tank, is 8 oz. Driving a $1\frac{1}{2}$ in. diameter airscrew of approximately $12\frac{1}{2}$ in. pitch at 3,600 r.p.m., it develops about .125 b.h.p. The fuel tank is formed with the carburetter, and various sizes may instantly be fitted giving any duration; the fuel used is Shell No. 1 and "Mobiloil" in proportion of 6-1.

The cylinder is produced from a solid bar of steel, specially heat-treated to ensure a glass-smooth bore and hard-wearing properties. The piston, fitted to fine limits, is of aluminium alloy, and has two $\frac{1}{8}$ in. Wellworthy rings, while the gudgeon pin is of steel, hardened, tempered and ground, and fitted with bronze retaining caps. The connecting rod is machined from solid duralumin, and the main bearing is of cast iron, pressed in the crank case, which is a light aluminium casting, specially strengthened and webbed to withstand shocks likely to be encountered when used on model aircraft.

A specially designed contact breaker incorporates totally enclosed oil-proof contact points. This may be seen in our illustration just above the crankshaft, between the airscrew and the crank case.

The overall dimensions of the "Andrich" engine are: Height, $5\frac{1}{2}$ in.; length (from airscrew face to carburetter), $4\frac{1}{2}$ in.; width, $2\frac{1}{2}$ in.



The A. E. Jones "Andrich" model petrol engine is a two-stroke type of 9 c.c. capacity. The combined carburetter and petrol tank may be seen at the rear; various sizes of tanks are used to suit the duration of flight required.

S.M.A.E. COMPETITIONS

THE following dates have been fixed by the Society of Model Aeronautical Engineers for the 1935 competitions:—

- April 22.—Elimination Trials for selecting the British team to be sent to America for the Admiral Moffett Trophy Contest.
- May 12.—Gamage Cup Competition.
- June 16.—Gliding Competition for "M.E." No. 1 Cup.
- July 7.—Power Competition for Sir John Shelley Cup.
- August 4.—National Competition for the S.M.A.E. Cup.
- August 5.—International Competition for the Lord Wakefield Cup.
- August 25.—Scale Model Flying Competition—C.S.S.A. Cup.
- September 8.—Seaplane Competition—Lady Shelley Cup.
- September 29.—Speed Competition—Flight Cup.
- October 31.—Closing date for Farrow Shield Contest.



MASS PRODUCTION: Component parts, and a finished example, of the all-metal Rigby "Swallow"—of which several thousands were recently constructed. (Flight photograph.)

SKYBIRD LEAGUE

THE second annual Skybird League Rally and Competition of Scale Model Aircraft will be held in April next. In addition to the competition for the best model submitted by a club, there will be an open competition for all individual members, both club and associate. There will be awards for competitors under 16 and over 16, and in addition to the challenge cups there will be an interesting list of awards, including an autographed copy of *King of Air Fighters*, presented by Flt. Lt. Ira Jones.

INDOOR FLYING MEETINGS

ONCE again a series of these popular meetings have been arranged by the Model Aircraft Club (T.M.A.C.). They will be held, as before, at the Royal Horticultural Hall, Vincent Square, Westminster, from 7 to 9 p.m., on the following Wednesdays: January 30, February 13, and March 13.

MODERN MODELS

IT is the intention of *Flight* to publish in this section brief illustrated descriptions of successful flying models, and possibly constructors of such machines would care to submit them—together with technical data—for inspection and the preparation of sketches.

THE MODEL FLYER'S GUIDE

FROM F. R. Barnard, the "North London Aeromodel Specialist," of 2a, Hornsey Rise, London, N.19, comes a handy reference book for aeromodelists. Besides giving a number of useful hints and tips on construction and materials, a list of Model Clubs, records and competitions, it also contains particulars and prices of model aeroplane kits and drawings, materials and accessories for constructing models, and outline drawings of well-known British aircraft. The price of this guide is 3d.

NEW BOOKS

A Mannock Biography: Cathcart Jones' Reminiscences: Our First Air Mail

Mannock

"King of Air Fighters." *A Biography of Major "Mick" Mannock, V.C., D.S.O., M.C., by Flight Lieutenant Ira Jones, D.S.O., M.C., D.F.C., M.M. (Ivor Nicholson and Watson, Ltd., London, 10s. 6d. net).*

(Reviewed by Major F. A. de V. Robertson, V.D.)

It was high time that a biography of Major Mannock should appear, and gratitude is due to his old companion-in-arms, Flt. Lt. I. Jones, for telling the story of this great air fighter. The title of the book shows that it is meant to be contentious, for it asserts that Mannock was the greatest of all the single-seater pilots in the great war. This will not be admitted by everybody, but in support of the claim it may be recalled that towards the end of the war the Air Ministry sent an Intelligence officer to make a tour of the squadrons at the front, and this officer reported to the present reviewer that Mannock must be held the greatest of the British fighter pilots.

Flt. Lt. Jones makes several claims for his friend. The first is that he was the greatest individual fighter, as he was never even wounded in air combat, and was finally killed by fire from the ground. To be fair, there are others of whom no less can be said. Secondly, he claims that he was the greatest tactical leader of fighters, perhaps even the first great tactical leader, who planned his attacks on German fighters with such skill and cunning that they were practically "foolproof." Though McCudden was also a very skilful tactical leader, and his glory was of a slightly earlier date than that of Mannock, there are probably few who will dispute Mannock's claim to first place in leadership. Another claim is that Mannock was the most modest of fighters, and that though he admitted an ambition to set up a tale of "confirmed" victories which would beat those of McCudden and von Richthofen, he would often give credit for one of his own victories to some other member of his flight or squadron. Finally, the author claims for Mannock and for all other British air fighters that their offensive spirit was far greater than that of the German fighters. In particular, the author devotes a long passage to comparisons between Mannock and von Richthofen. We quote the following:—

"Mannock's character and record appear to be almost the complete antithesis of Richthofen's. Mannock never made exaggerated claims: Richthofen often did. Mannock often gave credit of a personal victory to a comrade: Richthofen never did; he did the opposite. Mannock had no thirsting desire for decorations or self glorification: Richthofen lived for both. Mannock was not jealous of other airmen's achievements: Richthofen at one time was jealous even of his brother. Mannock had no desire to kill just for the sake of killing: Richthofen's destructive and vainglorious nature made men's, birds', or animals' lives equally cheap. Mannock was the personification of modesty: Richthofen was boastful and conceited. Mannock was loved and admired by all men: Richthofen was not loved. Mannock was the spearhead of every attack, and fought where the battle raged hottest: Richthofen moved to his place of security on the fringe of the battle as soon as it had commenced. Mannock was a leader with the 'Nelson touch': was Richthofen?"

Over-enthusiasm

This list of comparisons suffers from over-enthusiasm for the hero of the book, and results in charges against the German which are not strictly fair. No sportsman will admit that it was discreditable in Richthofen to have been fond of shooting game. It must also be seriously questioned if Richthofen could have been such an inspiration to the German flying corps as he undoubtedly was if he had been a mere scalp-hunter. His own letters certainly give the impression that he fought more for his own glorification than to win victory in the war for Germany, while Mannock most certainly fought to kill the enemies of the Allies. But it is quite a tenable theory that Richthofen's letters do not do him justice. At any rate, he and his fellow-pilots took such toll of the British reconnaissance aeroplanes that they would certainly have broken the spirit of any pilots less dogged than the British. That was a notable service to his country, whether he described it so or not.

Flt. Lt. Jones depreciates Richthofen for having made such

a bag of reconnaissance machines, which were easy quarries to a skilled fighter, while Mannock used to say to his pilots, "Don't forget we are fighting scouts, and that our job is to clear them out of the sky before we attack any old, fat two-seater." It is pertinent to remark that in a land campaign the duties of fighters are two (a) to make the air safe for their own reconnaissance machines, and (b) to forbid the air to enemy machines, with the object that their own side shall get all possible information while the other is left in ignorance. Richthofen concentrated mainly on destroying the reconnaissance machines of the enemy, whom he could find in plenty on his own side of the lines; Mannock on making the air safe for his own side. The latter was far the more difficult and dangerous work, and more glory was to be won by pursuing it, but both were equally important duties. In glory Mannock certainly stands higher than the German, but in service to their respective armies the two may be counted roughly equal.

In one respect it is impossible to make excuses for the conduct of either Mannock or Richthofen, for each on at least one occasion fired on an enemy machine which he had forced down behind his own lines, trying to kill men who were certain to be made prisoners. Mannock was one of the very few British airmen who really hated the Germans and wanted to kill as many of them as possible, though his killing was from some motive much higher than selfish scalp-hunting. Ball wrote in letters home that he hated to see his enemies going down, but that he must do his duty; Boelcke wrote: "We have nothing against the individual; we only fight to prevent him flying against us." These sentiments found no echo in Mannock's breast. On the day when Richthofen was killed the officers of No. 74 Squadron drank "To the health of the dead Baron," but Mannock would not honour the toast. This bitterness was in strong contrast to all the lovable characteristics which he showed to his friends. He was, as the author says, a strangely complex Irish character.

Tactics and marksmanship are now sedulously practised by all our fighter squadrons, but during the war there was little enough of either. Mannock insisted on the importance of both, and proved by his acts and his leadership the soundness of his theories. It will certainly be hard for anyone to disprove his friend's claim that he was the greatest fighting leader in the air during the great war.

Varied Adventures

"Aviation Memoirs," by Owen Cathcart Jones. (Hutchinson, London. 12s. 6d. net.)

There has recently been a spate of books from people who have made record flights, or who have, in the course of their daily business, done a great deal of flying.

This book by Mr. Cathcart Jones is one of the more readable of this variety. He takes his readers in a breezy, light and interesting manner from the days when, as an officer in the Royal Marines, he first applied for a job in the then newly formed Fleet Air Arm. His adventures during his time as a pilot in Aircraft-Carriers make good reading, and show the reader China, Malta, and Palestine. Following his period in the Fleet Air Arm he turned professional pilot to a number of well-known people, including the late Lt. Cdr. Glen Kidston, R.N., with whom he made a record flight from England to Cape Town in a Lockheed "Vega." Thereafter, we are led down through a period of many vicissitudes to the England-Australia Race, in which Mr. Cathcart Jones, with Mr. K. Waller, flew Mr. Rubin's D.H. "Comet," and came straight back from Melbourne after the race.

Few books which we have lately reviewed contain so much "meat" on each page, and by reading between the lines it is possible to get a great deal of knowledge, not only of the training of Fleet Air Arm pilots, but also of the places which the author visited.

The book is unusually well illustrated, with photographs which Mr. Cathcart Jones has collected or taken himself, and many of these photographs are extremely graphic and educative. They show the mishaps which occur to aircraft in the Fleet, and also to Communists who happen to be caught in Canton; the result is equally effective in both cases. C. N. C.

Book Reviews (cont.)—

An Early Air Mail

"The Coronation Aerial Post—1911." By Francis J. Field and N. C. Baldwin. (Francis J. Field, Ltd., Sutton Coldfield, Warwick. 5s. net.)

IN this extraordinarily detailed history of the first official aerial post in the United Kingdom—the experimental service operated between London and Windsor in 1911—the authors have presented some extremely interesting information, not only from the philatelic point of view, but also in regard to the early days of flying. For, in addition to giving full details of the exact number of cards and envelopes carried, the number printed, and the varieties, postmarks, and other items relating to the service, full accounts of each of the flights made and particulars of the pilots and machines are also set out.

This book, therefore, which has over eighty pages and numerous illustrations, apart from being a most valuable reference for Air Post Collectors, makes most interesting reading to those interested in the history of aviation and air mails.

In conclusion, we might quote a comparison given of this London-Windsor service of 1911 and Imperial Airways Services in 1933.

Pilots engaged: London-Windsor, 3. Imperial Airways, 35.

Machines engaged: London-Windsor, 3. Imperial Airways, 40.

Length of airways: London-Windsor, 20. Imperial Airways, 14,000 miles.

Total mileage flown: London-Windsor, 720. Imperial Airways, 3,000,000 miles.

Total mails: London-Windsor, 1,015½ lb. Imperial Airways, 330,000 lb. V. J.

Another War Book

"Winged Victory," by V. M. Yeates. (Jonathan Cape, London, 10s. 6d. net.)

A plain, unvarnished tale of the war. The author has faithfully portrayed the incredibly dull and yet nerve-racking periods of boredom which alternated with the periods of hectic excitement and fear. As a novel it is, perhaps, somewhat too solid, but as a record of a part of the war seen through the eyes of an ordinary pilot, it is excellent. It is almost the only war book we have read in which the high lights have not been coloured to such an extent that they have over-riden the everyday aspect of the work.

"Winged Victory" cannot be advocated as meat for the avid seeker after stirring tales of daring (although the combat descriptions are good), but it is valuable as presenting the War as a ghastly, tragic, nerve-racking mistake which broke up more men than were killed or wounded. In this it differs from many similar books, for it is in no wise the whining autobiography of a youngster who let the War get the better of him. C. N. C.

THE INDUSTRY

A THOROUGH TRAINING SCHEME

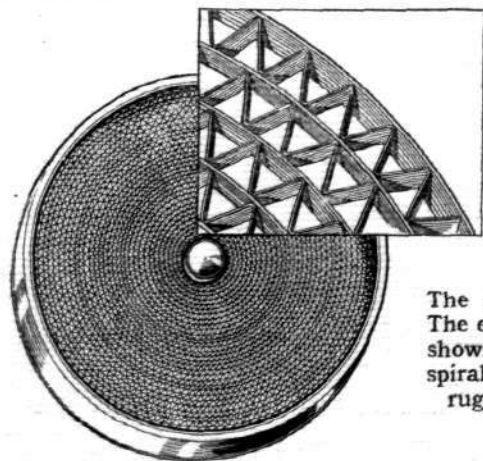
FINDING difficulty in obtaining suitable people for their business, Phillips and Powis Aircraft (Reading), Ltd., who operate the flying school at Reading, and produce "Hawk" aircraft and "Cirrus II" and "Cirrus III" engines, have started a training scheme to provide a supply of eligible men. Their aim is to secure young men of initiative who would normally start businesses on their own—that is, youths whom they can ultimately treat as junior partners, and not merely as employees.

Pupils will be expected to qualify as pilots; they will be taught how to use machine and hand tools; the planning and laying-out of workshops, jigs, fixtures, etc.; the inspection system and its importance; costing of hand and machining operations; store keeping and buying; draughtsmanship and aeronautical construction; design and stressing; salesmanship; accounting and company procedure; and, in fact, to assimilate all the knowledge that a man must have to build up an aircraft business successfully.

The first term will begin early in February, and will consist of ten pupils only. Fees for the two years' training are £400 a year, payable in advance, and will cover the whole of the training, flying (where owner's machine is provided) and the business training as distinct from a purely theoretical one. Those pupils who wish to live on the aerodrome will be able to do so in the club house, where they can have residence and full board for £125 a year.

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The Amal Flame Trap: The enlarged portion inset shows how it is built up of spirals of flat and corrugated metal ribbon.

fitted in the carburettor intake and petrol tank filler and thus reduce the fire risk from these sources.

The Amal flame trap, as may be seen from the drawing, consists of a finely corrugated ribbon of special non-corrosive metal (unaffected by sea water) wound together in the form of a flat spiral. A series of short triangular tunnels of very small area are thus produced, and these—more or less on the principle of the well-known Davy miners' safety lamp—prevent the passage of flame, which is broken up into numerous small flames, each being cooled out by the metal.

On the other hand, when fitted in an air intake the flame trap offers very little restriction to the incoming air, 80 per cent. of the area giving a free air passage. When fitted in the filler pipe of the petrol tank it prevents, in a similar way, the contents catching fire or exploding in the event of some source of ignition being in the vicinity of the tank.

The Amal flame trap, which has been approved and adopted by the Air Ministry, is made in various sizes, circular or square form, to suit different requirements.

CAPT. STOCKEN'S ILLNESS

His many friends at home and abroad will be glad to learn that Capt. Rex Stocken, aeronautical consultant, of 20, Lower Regent Street, London, S.W.1, has now recovered from his protracted illness and is back at work. Capt. Stocken has been ill ever since the Paris Aero Show in November.

NEW COMPANIES

C. L. W. AVIATION COMPANY LTD. (41 & 43, Westminster Bridge Road, S.E.1.) Capital £500 in £1 shares. Objects: To acquire certain patents and other rights belonging to A. Levell, F. S. Welman and S. W. Cole, and to carry on the business of manufacturers of aeroplanes or parts thereof, etc. The directors are: Stanton W. Cole, The Turret, Footscray Lane, Sidecup, (director of S. Wilding Cole Ltd.). Arthur Levell, Cheiveley Road, Bexleyheath, aeronautical engineer. Francis S. Welman, 55, Pinnacle Hill, North Bexleyheath, aeronautical engineer. Secretary: Fredk. J. Osborne. Solicitors: Guscotte & Co., 19, Essex Street W.C.2.

PUBLICATIONS RECEIVED

Brochure. *An ideal Achieved in Steel*. "Diamet" Inspected Steel. Sheffield: The United Steel Companies Ltd., 17, Westbourne Road.
Aircraft Progress and Development. By Capt. P. H. Sumner. Price 25/- net. London: Crosby Lockwood & Son Ltd.
The Aeronautical Ground Engineer's "X" Licence. By Capt. S. L. Collins. A.M.I.A.E. Price 15/- net. London: John Hamilton Ltd.
An Elementary Course of Aviation. By Flt. Lt. C. W. Hewitt. Price 3/6 London: John Hamilton Ltd.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in parentheses are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1933.

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- 29910. FAIRY AVIATION Co., LTD., and LYON. G. Radiators for evaporative engine cooling systems. (421,683.)
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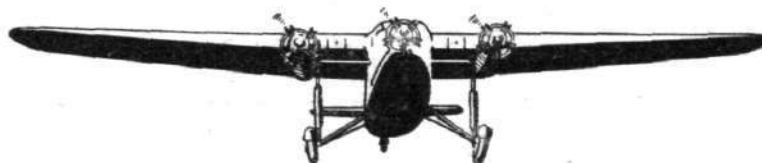
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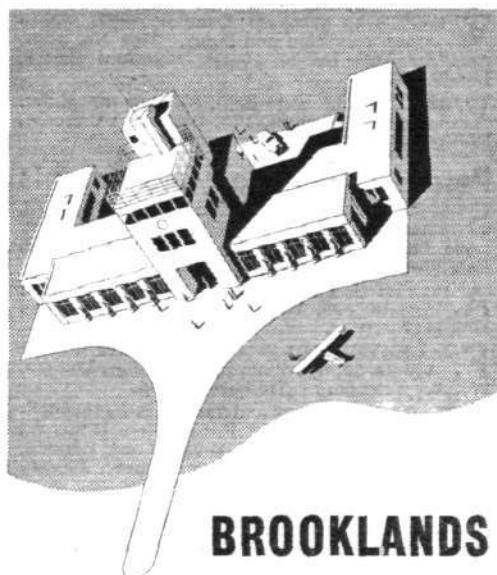
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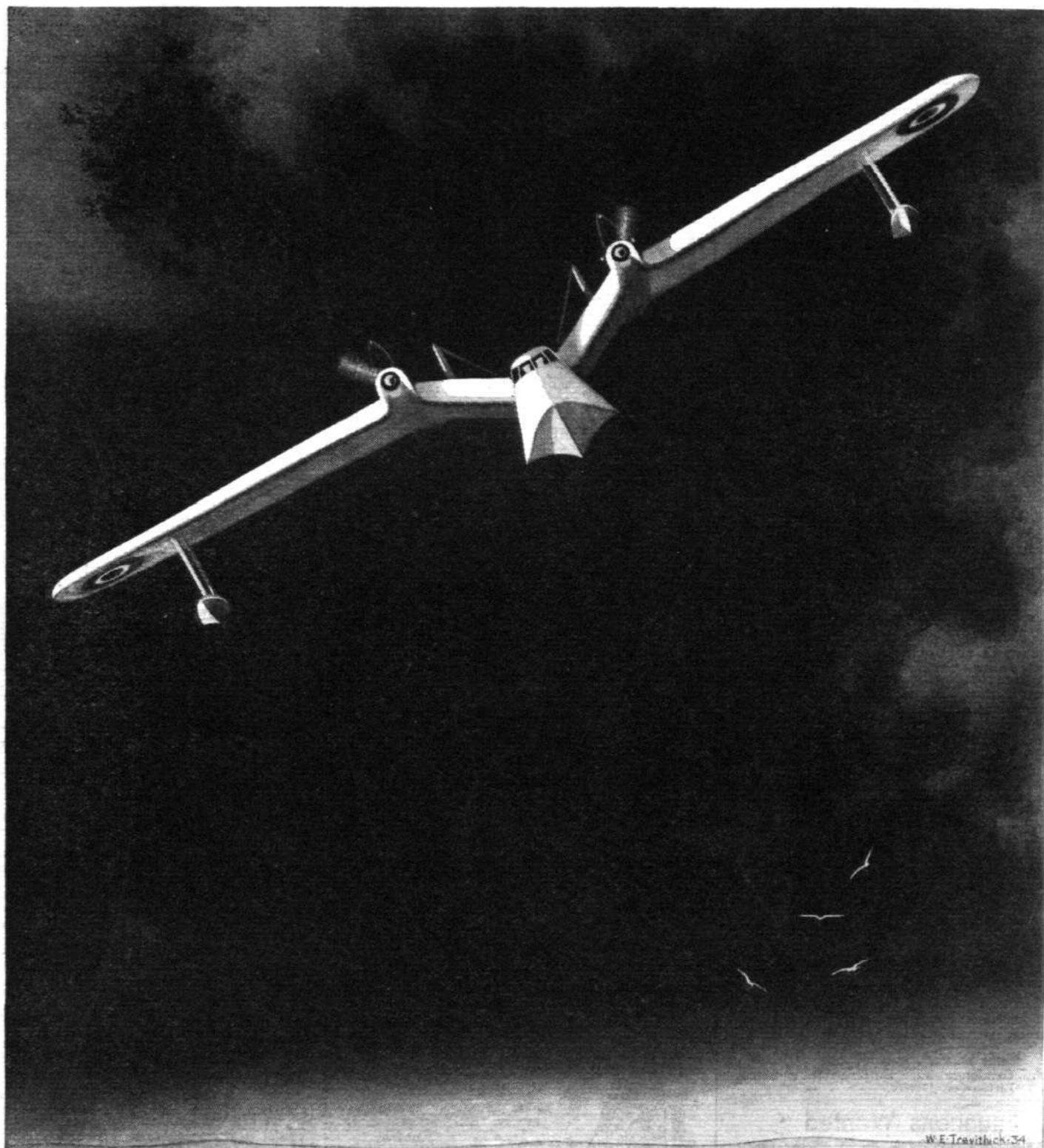
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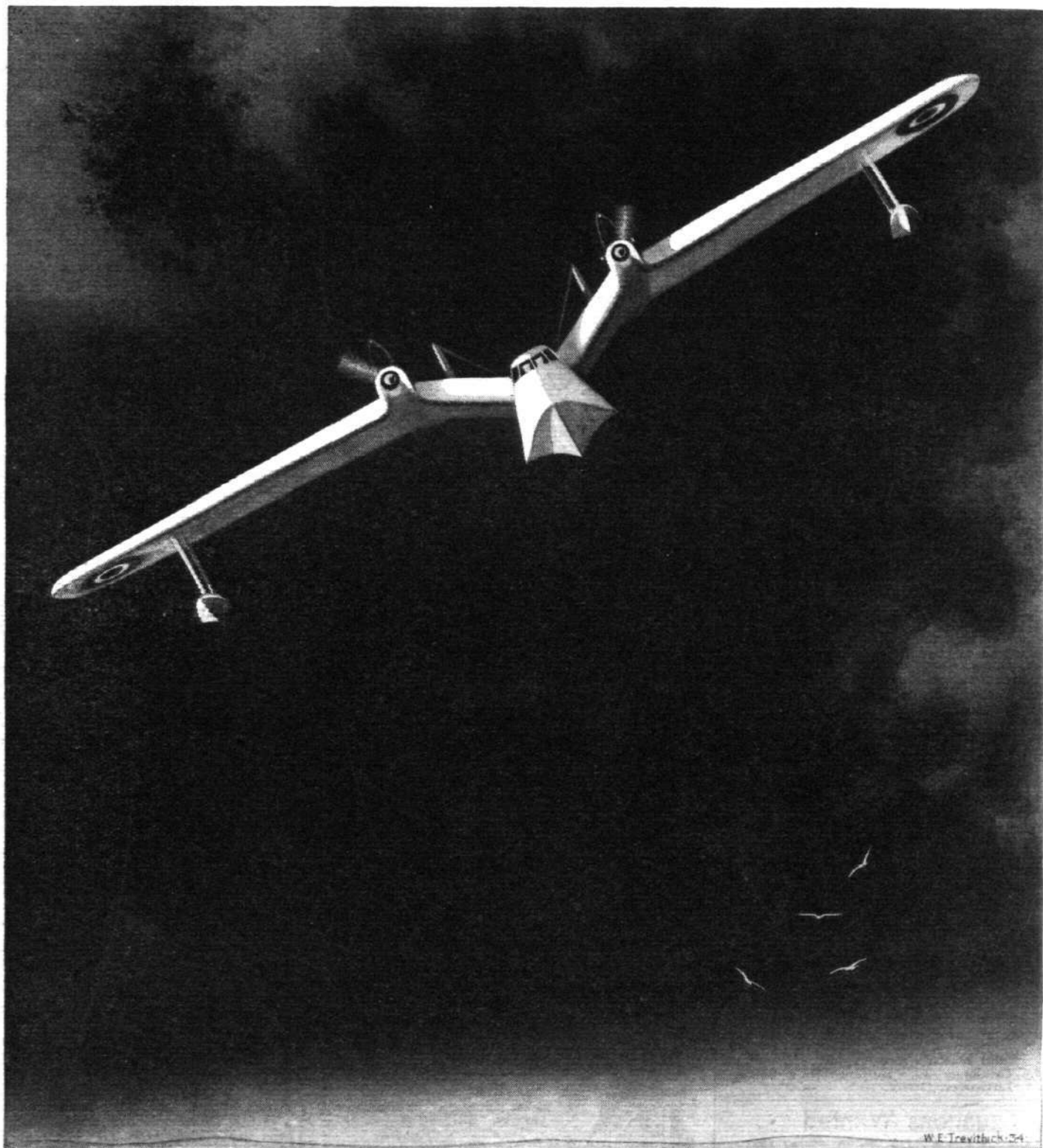
The Schwarz Patent Process completely covers and protects the airscrew from flying stones, heavy rain, corrosion, and the effects of changing humidity.

This process is ideally suited for this machine, which is being used for demonstration purposes in India.

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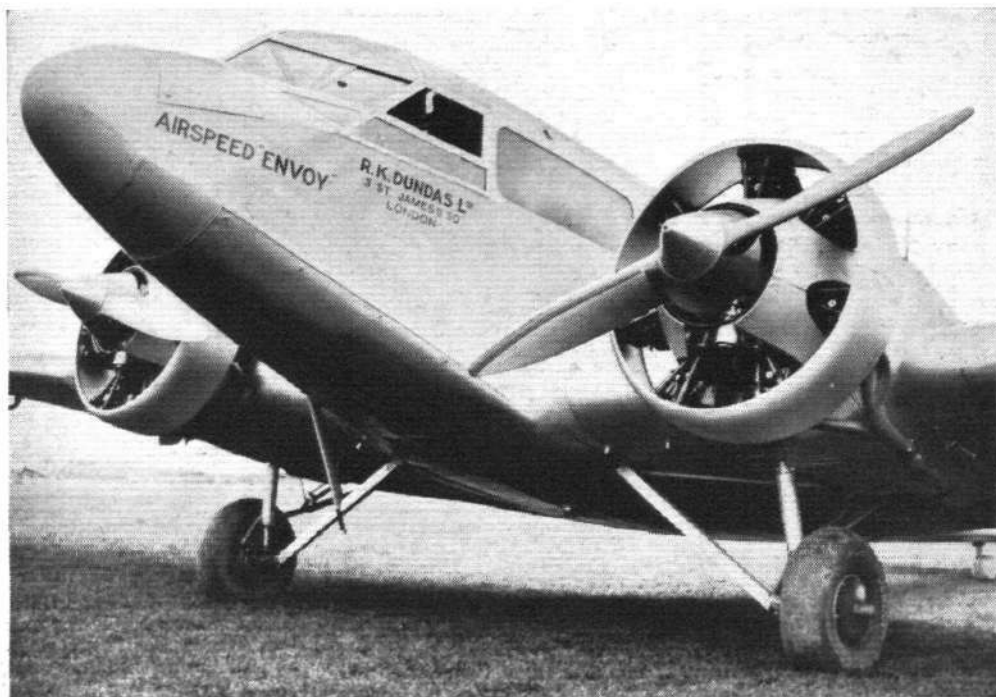


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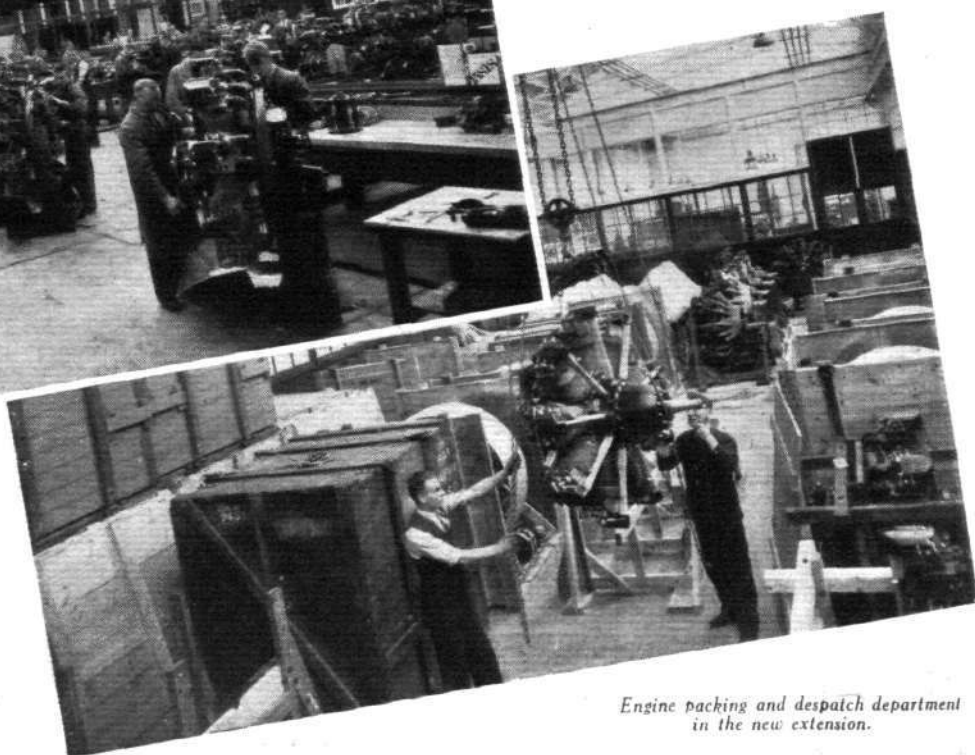
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